BANGALORE WATER SUPPLY AND SEWERAGE BOARD

5th Floor, Cauvery Bhavan "D" Block,
K.G. Road, Bangalore 560009

Tender for the Work of Rehabilitation & Upgradation of existing 300 KLD STP to 1000 KLD SBR followed by Ultrafiltration (UF) based STP at Bhattarahalli Lake

(Through Karnataka Procurement Portal only)

https://www.kppp.karnataka.gov.in

Office of the Chief Engineer (UWP)
BANGALORE WATER SUPPLY & SEWERAGE BOARD
5th Floor, Cauvery Bhavan D-Block,
K.G. Road, Bangalore 560009
Telephone – 080-22945106

TENDER REFERENCE :	:	No.: BWSSB/CE(UWP)/ACE(UWP-1)/DCE(UWP)/TA/ 885/ 2026-27 Dated: 31.07.2026.
NAME OF THE WORK	:	Work of Rehabilitation & Upgradation of existing 300 KLD STP to 1000 KLD SBR followed by Ultrafiltration (UF) based STP at Bhattarahalli Lake
LAST DATE AND TIME FOR RECEIPT OF TENDERS	:	17-08-2026 17.00 hrs
TIME AND DATE OF OPENING OF TECHNICAL TENDERS	:	18-08-2026 17.30 hrs
PLACE OF OPENING OF TECHINCAL TENDERS	:	Office of The Chief Engineer (Used Water Project) Bangalore Water Supply & Sewerage Board 5th Floor, Cauvery Bhavan D-Block, K.G. Road, Bangalore 560009
TIME AND DATE OF OPENING OF PRICE TENDERS	:	Will be intimated to the qualified tenderers
PLACE OF OPENING OF PRICE TENDER	:	Will be intimated to the qualified tenderers
ADDRESS FOR COMMUNICATION	:	Office of The Chief Engineer (UWP) Bangalore Water Supply & Sewerage Board 5th Floor, Cauvery Bhavan D-Block, K.G. Road, Bangalore 560009

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BANGALORE WATER SUPPLY AND SEWERAGE BOARD
Office of The Chief Engineer (Waste Water Management-East)
5th Floor, Cauvery Bhavan, K.G. Road, Bangalore-560009

INVITATION FOR TENDER

(ONLY THROUGH KARNATAKA PROCUREMENT PORTAL)

IFT No.: BWSSB/CE (UWP)/ACE(UWP-1)/DCE(UWP)/TA / 885/202627
Dt: 31.07.2026.

SECTION 1
INVITATION FOR TENDER

The Chief Engineer (Used Water Projects) invites tenders from eligible tenderers for **Work of Rehabilitation & Upgradation of existing 300 KLD STP to 1000 KLD SBR followed by Ultrafiltration (UF) based STP at Bhattarahalli Lake** detailed in the table below. Tenderers are requested to submit their tender, EMD and details of their capability to undertake the tender (as detailed in ITT Clause-3 & 6) in the Karnataka Public Procurement Portal. Price tender will be opened only if the Tenderer is found to be qualified to execute the tendered works. Tenderers are advised to note the minimum qualification criteria specified in clause 3 of the Instructions to Tenderers to qualify for award of the contract.

1. Tender documents may be downloaded through Karnataka Procurement Portal www.kppp.karnataka.gov.in website only from **03-08-2026 to 17-08-2026**. Interested Tenderers may obtain further information by accessing the same website.
2. Tenders must be accompanied by Earnest Money Deposit specified for the work in the Table below. EMD will have to be in any one of the forms as specified in the Tender document and shall have to be valid for **45** days beyond the validity of the tender.
3. The last date and time for receipt of tenders in the Electronic Tender Box in website (www.kppp.karnataka.gov.in) is 17-08-2026 up to 17.00 hrs. The technical bids will be opened on 18-08-2026 at 17.00 hrs. If the bid-opening day remains as public holiday, bids will be opened on the next working day at the original stipulated time.
4. Other details can be seen in the tender documents

Sl. No	Name of the work	Tender processing fee	Amount put to tender Rs.	Bid security Rs.	Period of complet	Eligibility criteria during last 5 years (2021-22,2022-23,2023-24,2024-25 & 2025-26)

			(approx)	(EMD)	ion		
						Financial Turnover (in all classes of Civil Engg. Construction works) for any of the two years during the last five years Rs.	Performance and work Qualification
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Work of Rehabilitation & Upgradation of existing 300 KLD STP to 1000 KLD SBR followed by Ultrafiltration (UF) based STP at Bhattarahalli Lake	**As per Karnataka procurement portal.**	**Rs. 327.53 Lakhs (Excluding GST @ 18%)**	**Rs. 4.91 lakhs**	**12 months**	**Rs.772.97 lakhs**	**1)** As a Prime Contractor, the tenderer should have satisfactorily completed at least one similar nature of work i,e The Applicant shall provide evidence that it has successfully completed Design and construction of at least one similar STP of not less than **INR 193.24 Lakhs in last 5 (Five)years.** **2)** The tenderer should have executed in any one financial year, a minimum quantity of a) The Tenderer as a sole entity shall have successfully executed including complete Design, Procurement, Supply, Installation, Construction, Testing, and Commissioning of all Civil, Mechanical, Electrical, and

							Instrumentation Works of **One (1) No. Sewage Treatment Plant Contract of 0.8 MLD (800 KLD) capacity based on the SBR process along with PLC and SCADA and the plant should be in operation for a period of One Year within the last Five (5) years in India as on date of submission. The plant must have been designed for outlet parameters as BOD ≤ 10 mg/l, TSS ≤ 10 mg/l, COD ≤ 50 mg/l, TN ≤ 10 mg/l, and TP ≤ 1 mg/l.** **b)** The Tenderer as a sole entity shall have successfully executed including complete Design, Procurement, Supply, Installation, Construction, Testing of all Civil, Mechanical, Electrical, and Instrumentation Works of **UF/Disc Filter/Multi Media Filter in SBR/ASP based STP.** **3)** Each tender should further demonstrate: Assessed

							available tender capacity **= (A*N*1.5 – B)>= Rs. 386.49 Lakhs (Amount put to tender including GST@18%)** Where, A = Maximum value of civil engineering works executed in any one year during the last five years (updated to 2026-27 price level at 10% per year) taking into account the completed as well as works in progress. N = Number of years prescribed for completion of the works for which tenders are invited. B = Value, at 2026-27 price level, of existing commitments and on-going works to be completed during the next **12** months**.** **4)** Liquid assets and /or availability of credit facilities of no less than **Rs.115.95 lakhs**(Credit lines/letter of credit/certificates from Nationalized / Schedule banks in India for meeting the fund requirement etc.)

NOTE: 1.a The amount put to tender Rs. 327.53 Lakhs is Excluding GST at 18% and the bidder should quote for the amount.

b.The GST amount is of Rs. 58.96 Lakhs

2.The financial bid evaluation will be based on 1(a) of above Note

5. EMD shall be paid through OTC, NEFT, DEBIT CARD & CREDIT CARD through Karnataka Public Procurement Portal Only. The value of the Bid Security / EMD is as mentioned in the table above in column no 5.
6. Tenderers can access tender documents from www.kppp.karnataka.gov.in website only and upload the required details; those are mentioned in different sections in the bid document in to electronic tender on the website. Scanned documents those are required to be furnished as per Section 2, 3 & 4 of the bid document shall be submitted through Karnataka Public Procurement Portal.
7. The Tender processing fee once paid will not be refunded.
8. The successful Tenderer would be required to furnish the performance Bank Guarantee from a Nationalized / Scheduled Indian Bank, with jurisdiction at Bangalore as specified, towards guarantee for completion of work within the stipulated period as mentioned in tender document.
9. Applications / requisitions from joint venture Firms are not acceptable.
10. Bangalore Water Supply and Sewerage Board (BWSSB) reserves the right to cancel or annul the entire or part of this process of invitation at any time without assigning any reasons.
11. For any additional information regarding the above tender, the firms who are interested to quote, may contact office of the undersigned at the office address given below on all working days during office hours (10:30hours to 17:00 hours).

Bangalore Water Supply & Sewerage Board
Office of Chief Engineer (UWP)
5th Floor, Cauvery Bhavan,
K.G.Road, Bangalore.
Telefax:080-22945106

12. Tenderers shall submit offers that comply with the requirements of the bid document.
13. Successful Bidder has to follow the SWD (Solid Waste Management Rules 2016) in this tender work.

Corrigendum / Modification / Corrections, if any will be published in the website only.

Sd/-

Chief Engineer
(Used Water Project)

SECTION 2:

INSTRUCTIONS TO TENDERERS (ITT)

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A. General

1. Scope of Tender

1.1 The **Chief Engineer (UWP),** (Referred to as Employer in these documents) invites tenders following Two Stage Karnataka Public Procurement Portal procedure, from eligible Tenderers, **:** Work of Rehabilitation & Upgradation of existing 300 KLD STP to 1000 KLD SBR followed by Ultrafiltration (UF) based STP at Bhattarahalli Lake **(**as defined in these documents and referred to as "the work") detailed in the Table given in the Invitation for Tenders (IFT).

2. **Eligible Tenderers**

2.1 Tenderers shall not be under a declaration of ineligibility for corrupt and fraudulent practices issued by the Government of Karnataka

2.2 Tenders from Joint ventures are not acceptable.

3. Qualification of the Tenderer:

3.1 All Tenderers shall provide the requested information accurately and in sufficient
detail in Section 3: Qualification information.

3.2 To qualify for award of this contract, each Tenderer in its name should have in the
last five years i.e. (2021-22 to 2025-26)

a) Achieved in at least two financial years a minimum financial turnover (in all classes of civil engineering construction works only) of **Rs.772.97 lakhs.**

(a) Contracts of Similar Size and Nature: As a Prime Contractor, the tenderer should have satisfactorily completed at least one similar nature of work i.e, The Applicant shall provide evidence that it has successfully completed Design and construction of at least one similar STP of not less than **INR 193.24 Lakhs in last 5 (Five)years.**

i. The tenderer should have executed in any one financial year, a minimum quantity of

a) The Tenderer as a sole entity shall have successfully executed including complete Design, Procurement, Supply, Installation, Construction, Testing, and Commissioning of all Civil, Mechanical, Electrical, and Instrumentation Works of **One (1) No. Sewage Treatment Plant Contract of 0.8 MLD (800 KLD) capacity based on the SBR process along with PLC and**

SCADA and the plant should be in operation for a period of One Year within the last Five (5) years in India as on date of submission. The plant must have been designed for outlet parameters as BOD ≤ 10 mg/l, TSS ≤ 10 mg/l, COD ≤ 50 mg/l, TN ≤ 10 mg/l, and TP ≤ 1 mg/l.

b) The Tenderer as a sole entity shall have successfully executed including complete Design, Procurement, Supply, Installation, Construction, Testing of all Civil, Mechanical, Electrical, and Instrumentation Works of **UF/Disc Filter/Multi Media Filter in SBR/ASP based STP.**

3.3 Each Tenderer should further demonstrate:

a. DELETED

b. Liquid assets and /or availability of credit facilities of not less than **Rs. 115.95 lakhs** (Credit lines/letter of credit/certificates from Nationalised / Schedule banks in India for meeting the fund requirement etc.,

c. As on date of submission of bid Tenderes blacklisted om Government of India / Government of Karnataka / any other state or any Central / state government undertaking are not eligible to bid.

3.4 To qualify for a package of contracts made up of this and other contracts for which tenders are invited in this IFT, the tenderer must demonstrate having experience and resources to meet the aggregate of the qualifying criteria for the individual contracts.

3.5 Sub-contractors experience and resources shall not be taken into account in determining the Tenderers compliance with the qualifying criteria except to the extent stated in 3.2 above.

3.6 Tenderers who meet the above specified minimum qualifying criteria, will only be qualified, if their available tender capacity is more than the total tender value. The available tender capacity will be calculated as under:

a) Assessed available tender capacity = (A*N*1.5 - B)>= Rs.386.49 Lakhs (Amount put to tender including GST@18%)

where

A = Maximum value of civil engineering works executed in any one year during the last five years (updated to 2026-27 price level at 10% per year) taking into account the completed as well as works in progress.

N = Number of years prescribed for completion of the works for which tenders are invited.

B = Value, at 2026-27 price level, of existing commitments and on-going works to be completed during the next **12months.**

Note: The statements showing the value of existing commitments and on-going works as well as the stipulated period of completion remaining for each of the works listed should be countersigned by the Employer in charge, not below the rank of an Executive Engineer or equivalent.

3.7 Even though the Tenderers meet the above criteria, they are subject to be disqualified if they have:

- made misleading or false representations in the forms, statements and attachments submitted in proof of the qualification requirements; and/or
- record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc.; and/or
- participated in the previous Tender for the same work and had quoted unreasonably high tender prices and could not furnish rational justification.

4. One Tender per Tenderer:

4.1 Each tenderer shall submit only one tender for one package. A tenderer who submits or participates in more than one tender (other than as a sub-contractor or in cases of alternatives that have been permitted or requested) will cause all the proposals with the Tenderer's participation to be disqualified.

5. Cost of Tendering:

5.1 The tenderer shall bear all costs associated with the preparation and submission of his tender, and the Employer will in no case be responsible and liable for those costs.

6. Site visit:

6.1 The Tenderer at his own responsibility and risk is encouraged to visit and examine the Site of Works and its surroundings and obtain all information that may be necessary for preparing the Tender and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Tenderers own expense.

B. Tender documents

7. Content of Tender documents

7.1 The set of tender documents shall have all the Sections given in Page 2:

7.2 Both the sets should be completed and uploaded with the tender.

8. Clarification of Tender Documents

8.1 A prospective tenderer requiring any clarification of the tender documents may notify the Employer by posting in the web site

(Karnataka public procurement→My tenders→action→queries). No identity of the participating tenderer shall be mentioned in the query. All queries & replies can be viewed by all participating tenderers.

8.2 Pre-tender meeting: ***Deleted***

9. Amendment of Tender documents

9.1 Before the deadline for submission of tenders, the Employer may modify the tender documents by issuing addenda.

9.2 Any addendum thus issued shall be part of the tender documents and shall be posted in the Karnataka public procurement portal website for viewing by all the purchasers of the tender documents.

9.3 To give prospective Tenderers reasonable time in which to take an addendum into account in preparing their tenders, the Employer shall extend as necessary the deadline for submission of tenders, in accordance with Sub-Clause 16.2 below.

C. Preparation of Tenders

10. Documents comprising the Tender

10.1.1 The tender submitted in Karnataka Public Procurement Portal by the Tenderer shall contain the documents as follows:

a) Scanned copy of Earnest Money Deposit.
b) The form of Tender (in the format indicated in Section 4)
c) Scanned copies of the certificates supporting the Qualification as in Section 3. Any other materials required to be completed and submitted by Tenderers in accordance with these instructions. The documents listed under Sections 3, 4, 6 and 9 shall be filled in without exception. PHOTOCOPIES OF THE DOCUMENTS SHOULD BE NOTARISED.

10.1.2 Rates for the Bill of Quantities (Section 9) shall be quoted at the provision made in the Karnataka Public procurement website Portal.

10.2 Tenderers submitting tenders together with other contracts stated in the IFT to form a package will so indicate in the tender together with any discounts offered for the award of more than one contract.

11. Tender prices

11.1 The contract shall be for the whole works as described in Sub-Clause 1.1, based on the priced Bill of Quantities submitted by the Tenderer.

11.2 The Tenderer shall fill in the unit rates in figures for all items of the Works described in the Bill of Quantities. The system will automatically

calculate the amount of that item as well as the total Tender value. ***Items for which no rate is entered by the Tenderer will not be paid for by the Employer when executed and shall be deemed covered by the other rates in the Bill of Quantities***

11.3 All duties, taxes, and other levies payable by the contractor under the contract, or for any other cause, shall be included in the rates, prices and total Tender Price submitted by the Tenderer.

11.4 DELETED

12. Tender validity

12.1 Tenders shall remain valid for a period not less than **ninety days** after the deadline date for tender submission specified in Clause 16. A tender valid for a shorter period shall be rejected by the Employer as non-responsive.

12.2 In exceptional circumstances, prior to expiry of the original time limit, the Employer may request that the Tenderers may extend the period of validity for a specified additional period. The request and the Tenderers responses shall be made in writing or e-mail. A Tenderer may refuse the request without forfeiting his earnest money deposit. A Tenderer agreeing to the request will not be required or permitted to modify his tender, but will be required to extend the validity of his earnest money deposit for a period of the extension, and in compliance with Clause13 in all respects.

13. Earnest money deposit

13.1 Earnest Money Deposit shall be paid through Karnataka Procurement Portal only using any of the following four modes.

i. Credit Card (Online Payment)
ii. Direct Debit Using Internet Banking (Online Payment)
iii. Remittance at the Bank Counter - Challan (Offline Payment)
iv. NEFT (Offline payment).

13.2 Instruments having fixed validity issued as earnest money deposit for the tender shall be valid for 45 days beyond the validity of the tender.

13.3 Any tender not accompanied by an acceptable earnest money deposit and not secured as indicated in Sub-Clauses 13.1 and 13.2 above shall be rejected by the Employer as non-responsive.

13.4 The earnest money deposit of unsuccessful Tenderers will be returned within 30 days of the end of the tender validity period specified in Sub-Clause 12.1.

13.5 The earnest money deposit of the successful Tenderer will be discharged when the Tenderer has signed the Agreement and furnished the required Performance Security.

13.6 The Earnest money deposit may be forfeited:

a) if the Tenderer withdraws the Tender after tender opening during the period of tender validity;
b) if the Tenderer does not accept the correction of the Tender Price, pursuant to Clause 24; or
c) in the case of a successful Tenderer, if the Tenderer fails within the specified time limit to

(i) Sign the Agreement; or
(ii) Furnish the required Security deposit

14. Format and signing of Tender

14.1 The completed tender comprising of documents indicated in ITT 10, should be uploaded in the Karnataka Public Procurement Portal website along with scanned copies of requisite certificates those are mentioned in different sections in the bid document and scanned copy of tender Security / EMD.

14.2 All the documents should be uploaded in Karnataka Public Procurement website. Tenderer should take a print out of the Form of Tender in the Section 4 of the tender document on company letter head and should sign, stamp and upload the same to the tender. Authenticity of the singing authority shall be furnished. With this, it is taken that tenderer has signed & submitted the tender.

14.3 The Tender shall contain no alterations or additions, except those to comply with instructions issued by the Employer.

D. Submission of Tenders

15. Up-loading & submission of tenders

15.1 The tenders should be uploaded only through Karnataka Public Procurement Website. Tender should contain

A. Technical Tender consisting of following:

a. All the documents with required details in prescribed format; those are mentioned in different sections in the Tender. Form of Tender, etc., shall be downloaded, filled with required details, signed, scanned & uploaded to the Karnataka Public Procurement Portal (www.kppp.karnataka.gov.in)

b. The above documents along with notarized copies of documentary evidences as indicated in Section—2 of ITT, Section-3 Qualification information & Section-4 Forms of Tender shall be scanned and uploaded to the website compulsorily, failing which tender will be rejected in view of incomplete tender document and

B. Financial Tender consisting of Bill of Quantities

15.1 All rates for the items in the Schedule shall be posted in the work template provided in the tender document. Rates shall be entered in figures only.

15.2 DELETED

15.3 BID reference Number will be automatically generated by the server.

15.4 DELETED

16. Deadline for submission of the Tenders

16.1 DELETED.

16.2 The Employer may extend the deadline for submission of tenders by issuing an amendment in accordance with Clause 9, in which case all rights and obligations of the Employer and the Tenderers previously subject to the original deadline will then be subject to the new deadline.

17. Late Tenders

17.1 The software of Karnataka Public Procurement website system will not allow the Tenderer to upload the documents after expiration of the stipulated date & time of Bid submission. The Tenderer shall refer the server time, which will be displayed in the Karnataka Public Procurement Portal. BWSSB will not be responsible for non-receipt of bids on the stipulated date & time prescribed in clause 16, due to Internet Problems, improper uploading or any other related problems. In case of connectivity problems, Tenderer may contact Helpdesk of the Karnataka Public Procurement Portal service provider and may also draw the attention of tender inviting authority.

18. Modification and Withdrawal of Tenders

18.1 Tenderers may "modify" and "withdraw" their tenders multiple numbers of times, until the deadline for submission of tenders by operating the relevant provision made in Karnataka Public Procurement Portal.If the Tenderer withdraws the tender before the deadline for submission of tenders and later if he is interested to submit the tender once again, may do so within the stipulated date & time as mentioned in Clause 16. In this case within the stipulated date & time, the tenderer can once again submit the requisition to the officer inviting tenders for access to the withdrawn tender document for resubmission. For this tenderer need not make any additional payment towards the cost of tender document. Communication of modification / withdrawal by other means will not be accepted.

18.2 DELETED

18.3 No Tender may be modified after the deadline for submission of Tenders.

18.4 Withdrawal or modification of a Tender between the deadline for submission of Tenders and the expiration of the original period of Tender validity specified in Clause 12.1 above or as extended pursuant to Clause 12.2 may result in the forfeiture of the earnest money deposit pursuant to Clause 13.

18.5 DELETED

E. Tender opening and evaluation

19. Opening of Technical Bid of Tenders and evaluation to determine qualified Tenderers:

19.1 The Employer will open the Technical details of all the Tenders received (except those withdrawn), including modifications made pursuant to Clause 18, in the presence of the Tenderers or their representatives who choose to attend at the Employer's office mentioned in the earlier para at

15:00 hours on the date and the place specified. In the event of the specified date of Tender opening being declared a holiday for the Employer, the Tenders will be opened at the appointed time and location on the next working day.

19.2 WITHDRAWAL proposal submitted pursuant to clause 18 shall be read out first and their bids shall not be opened.

19.3 The Tenderers names, the presence or absence of earnest money deposit (amount, format and validity), the submission of qualification information and such other information as the Employer may consider appropriate will be announced by the Employer at the opening.

19.4 The Employer shall prepare minutes of the Tender opening, including the information disclosed to those present in accordance with Sub-Clause 19.3.

19.5 The Price Tenders of all the Tenderers including modifications for financial tenders cannot be opened as this is programmed to open later after evaluation of the Technical details of the participating Tenderers.

19.6 The Employer will evaluate and determine whether each tender (a) meets the eligibility criteria defined in ITT Clause 2; (b) is accompanied by the required earnest money deposit as per stipulations in ITT Clause and (c) meets the minimum qualification criteria stipulated in ITT Clause 3. The Employer will draw out a list of qualified Tenderers.

20. Opening of Financial Bid of qualified Tenderers and evaluation:

20.1 The Employer will inform all the Qualified Tenderers the time, date and venue fixed for the opening of the price Tenders. The Employer will open the price tender of Qualified Tenderers at the appointed time and date in the presence of the Tenders or their representatives who choose to attend. In the event of the specified date of Price tender opening being declared a holiday for the Employer, the price tenders will be opened at the appointed time and location on the next working day.

20.2 DELETED

20.3 The Tenderers' names, the Tender prices, the total amount of each Tender, any discounts, and withdrawals, and such other details as the Employer may consider appropriate, will be announced by the Employer at the opening. No Tender shall be rejected at Tender opening.

20.4 The Employer shall prepare minutes of the Price Tender opening, including the information disclosed to those present in accordance with Sub-Clause 20.3.

21. Process to be confidential

21.1 Information relating to the examination, clarification, evaluation, and comparison of Tenders and recommendations for the award of a contract shall not be disclosed to Tenderers or any other persons not officially concerned with such process until the award to the successful Tenderer

has been announced. Any effort by a Tenderer to influence the Employer's processing of Tenders or award decisions may result in the rejection of his Tender.

22. Clarification of Tenders

22.1 To assist in the examination, evaluation, and comparison of Tenders, the Employer may, at his discretion, ask any Tenderer for clarification of his Tender, including breakdowns of unit rates. The request for clarification and the response shall be in writing but no change in the price or substance of the Tender shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Tenders in accordance with Clause 24.

22.2 Subject to sub-clause 22.1, no Tenderer shall contact the Employer on any matter relating to its Tender from the time of the Tender opening to the time the contract is awarded. If the Tenderer wishes to bring additional information to the notice of the Employer, it should do so in writing.

22.3 Any effort by the Tenderer to influence the Employer in the Employer's Tender evaluation, Tender comparison or contract award decisions may result in the rejection of the Tenderers' Tender.

23. Examination of Tenders and determination of responsiveness

23.1 Prior to the detailed evaluation of Tenders, the Employer will determine whether each Tender; (a) has been properly signed; and; (b) is substantially responsive to the requirements of the Tender documents like (a)Form of Tender, (b)Declaration statement Scanned/ uploaded [including documents those are required to be furnished as per Section 2, 3 & 4 of the tender,]; (c) is accompanied by the required securities and; (d) is substantially responsive to the requirements of the tendering documents.

23.2 A substantially responsive Tender is one which conforms to all the terms, conditions, and specifications of the Tender documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the Works; (b) which limits in any substantial way, inconsistent with the Tender documents, the Employer's rights or the Tenderer's obligations under the Contract; or (c) whose rectification would affect unfairly the competitive position of other Tenderers presenting substantially responsive Tenders.

23.3 If a Tender is not substantially responsive, it will be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the non conforming deviation or reservation.

24. Correction of errors

24.1 Once the Tenderer key in the rates in figures, in the Bill of quantities provided, the system will automatically calculate the amount of that item as well as the total Bid value.

24.2 Deleted

25. Evaluation and comparison of Tenders

25.1 The Employer will evaluate and compare only the Tenders determined to be substantially responsive in accordance with Clause 23.

25.2 In evaluating the Tenders, the Employer will determine for each Tender the evaluated Tender Price by adjusting the Tender Price as follows:

(a) Making any correction for errors pursuant to Clause 24; and

(b) DELETED

25.3 The Employer reserves the right to accept or reject any variation, deviation, or alternative offer. Variations, deviations, and alternative offers and other factors which are in excess of the requirements of the Tender documents or otherwise result in unsolicited benefits for the Employer shall not be taken into account in Tender evaluation.

25.4 DELETED

25.5 If the tender of the successful tenderer is seriously unbalanced in relation to the Employer's estimate of the cost of the work to be performed under the contract, the Employer may require the Tenderer to produce detailed price analyses for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, the Employer may require that the amount of the performance security set forth in Clause 29 be increased at the expense of the successful Tenderer to a level sufficient to protect the Employer against financial loss in the event of default of the successful under the contract.

F. Award of Contract

26. Award criteria

26.1 Subject to Clause 27, the Employer will award the Contract to the Tenderer whose Tender has been determined to be substantially responsive to the Tender documents and who has offered the lowest evaluated Tender Price, provided that such Tenderer has been determined to be (a) eligible in accordance with the provisions of Clause 2, and (b) qualified in accordance with the provisions of Clause 3.

27. Employer's right to accept any Tender and to reject any or all Tenders

27.1 Not with standing Clause 26, the Employer reserves the right to accept or reject any Tender, and to cancel the Tender process and reject all Tenders, at any time prior to the award of Contract, without thereby incurring any liability to the affected Tenderer or Tenderers or any

obligation to inform the affected Tenderer or Tenderers of the grounds for the Employer's action.

28. Notification of award and signing of Agreement

28.1 The Tenderer whose Tender has been accepted will be notified of the award by the Employer prior to expiration of the Tender validity period by writing, e-mail or by registered letter. This letter (hereinafter and in the Conditions of Contract called the "Letter of Acceptance") will state the sum that the Employer will pay the Contractor in consideration of the execution, completion, and maintenance of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Contract called the "Contract Price").

28.2 The notification of award will constitute the formation of the Contract, subject only to the furnishing of Security deposit in accordance with the provisions of Clause 29.

28.3 The Agreement will incorporate all agreements between the Employer and the successful Tenderer. It will be kept ready for signature of the successful Tenderer in the office of Employer within 30 days following the notification of award along with the Letter of Acceptance. Within 20 days of receipt, the successful Tenderer will sign the Agreement and deliver it to the Employer.

28.4 Upon the furnishing by the successful Tenderer of the Performance Security, the Employer will promptly notify the other Tenderers that their Tenders have been unsuccessful.

29. Security deposit

29.1 Within 20 days of receipt of the Letter of Acceptance, the successful Tenderer shall deliver to the Employer a Security deposit in any of the forms given below for an amount equivalent to 5% of the Contract price plus additional security for unbalanced tenders in accordance with Clause 25.5 of ITT and Clause 44 of the Conditions of Contract. :

- A bank guarantee in the form given in Section 10;

29.2 If the security deposit is provided by the successful Tenderer in the form of a Bank Guarantee, it shall be issued either by a Nationalized/Scheduled bank and valid in accordance with Clause 43 of Condition of Contract.

29.3 DELETED

29.4 Failure of the successful Tenderer to comply with the requirements of Sub-Clause 29.1 shall constitute sufficient grounds for cancellation of the award and forfeiture of the Earnest money deposit.

30. DELETED

31. Corrupt or Fraudulent practices

31.1 The GOK requires that the Tenderers/Suppliers/Contractors, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, GOK :

a) will reject a proposal for award if it determines that the Tenderer recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;

b) will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded a GOK contract if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing, a GOK contract.

31.2 Furthermore, Tenderers shall be aware of the provision stated in sub-clause 50.2 of the Conditions of Contract.

Sd/-

Chief Engineer

(Used Water Projects)

SECTION 3:

QUALIFICATION INFORMATION

The following form is to be downloaded, particulars are to be filled, scanned & uploaded by the Tenderer.

The information to be filled in by the Tenderer hereunder will be used for purposes of computing Tender capacity as provided for in Clause 3 of the Instructions to Tenderers. This information will not be incorporated in the Contract.

1.1 Constitution or legal status of Tenderer [Attach copy]
Place of Registration _____
(Attach Copy)
Principal place of business: _____

1.2 Total value of civil engineering construction works executed and payments received in the last five years (in **Rs** Lakh)[attach certificate of Chartered accountant]

2021-22 _____
2022-23 _____
2023-24 _____
2024-25 _____
2025-26 _____

1.3 Work performed as Prime Contractor (in the same name) on works of similar nature over during the five years specified in 1.2 above.

Project Name	Name of Employer	Description of Work	Contract Number	Value of contract Rs. Lakh	Date of issue of work order	Specified period of completion	Actual date of completion	Remarks explaining reasons for delay in completion of work
1	2	3	4	5	6	7	8	9

1.4 Quantities of work executed as prime contractor (in the same name) during the last five years specified in 1.2 above: [to support the qualification criteria in ITT clause 3]

Year	Name of Work	Name of Employer	Quantity of work performed (cum)		Remarks (Indicate contract reference)

1.5 Information on works for which Tenders have been submitted and works which are yet to be completed as on the date of this Tender.

(A) Existing commitments and on-going works:

Description of Work	Place & State	Contract No. & Date	Name and Address of Employer	Value of Contract (Rs. Lakh)	Stipulated period of completion	Value of works remaining to be completed (Rs. Lakh)	Anticipated date of completion
1	2	3	4	5	6	7	8

(B) Works for which Tenders already submitted:

Description of Work	Place & State	Name and Address of Employer	Estimated value of works (Rs. Lakh)	Stipulated Date period of completion	when decision is expected	Remarks if any
1	2	3	4	5	6	7

1.6 Items of equipment essential for carrying out the works.

Item of Equipment	Requirement			Owned and available		Remarks
	No.	Capacity	Owned	Number/ Capacity	Age/ Condition	

1.7 Reports on the financial standing of the tenderer, such as profit and loss statements and auditor’s reports for the last five years;

1.8 Qualification and experience of the key technical and management personnel in permanent employment with the tenderer and those that are proposed to be deployed on this contract, if awarded.

1.9. Name, address, and telephone, telex, and fax numbers of the Tenderers' bankers who may provide references if contacted by the Employer.

1.10 Evidence of access to financial resources to meet the qualification requirement specified in ITT Clause3.3 (b): Cash in hand, Letter of Credit etc. List them below and attach certificate from the Banker in the suggested format as under:

BANKER'S CERTIFICATE

This is to certify that M/s. ..... is a reputed company with a good financial standing. If the contract for this work, namely ..... (name of the work) is awarded to the above firm, we shall be able to provide overdraft/credit facilities to the extent of Rs. ..... to meet the working capital requirements for executing the above contract

Sd/-
Name of the Bank, Senior Bank Manger
Address:
.....

1.11 Proposals for subcontracting components of works amounting to more than 20% of the contract price .

Item of Work	Value of Sub-Contract	Identified Sub-Contractor (Name and address)	Experience of similar work

1.12 Information on litigations in which the Tenderer is involved:

Other Party (ies)	Employer	Details of dispute	Amount involved	Remarks showing present status

1.13 The proposed methodology and program of construction, backed with equipment planning and deployment, duly supported with broad calculations and quality control procedures proposed to be adopted, justifying their capability of execution and completion of the work as per technical specifications within the stipulated period of completion as per milestones.

Sd/-

Chief Engineer

(Used Water Projects)

SECTION 4:

[Tenderer shall down load this page, print on the letter head, fill the gaps with signature, scan the sheet & upload to the website. Failing which the tender will be treated as non-responsive]

FORMS OF TENDER, LETTER OF ACEPTANCE, NOTICE TO PROCEED WITH THE WORK AND AGREEMENT FORM

Form of Tender

Description of the Work: **:** Work of Rehabilitation & Upgradation of existing 300 KLD STP to 1000 KLD SBR followed by Ultrafiltration (UF) based STP at Bhattarahalli Lake.

To

The Chief Engineer (Used Water Projects)
Bangalore Water Supply & Sewerage Board
5th Floor, Cauvery Bhavan D-Block,
K.G. Road, Bangalore 560009

GENTLEMEN,

We offer to execute the Works described above in accordance with the Conditions of Contract accompanying this Tender for the Contract Price uploaded for this tender to be opened after qualification.

This Tender and your written acceptance of it shall constitute a binding contract between us. We understand that you are not bound to accept the lowest or any Tender you receive.

We undertake that, in competing for (and, if the award is made to us, in executing) the above contract, we will strictly observe the laws against fraud and corruption in force in India namely “Prevention of Corruption Act 1988”.

We hereby confirm that this Tender complies with the Tender validity and Earnest money deposit required by the Tender documents.

We attach herewith our current income-tax clearance certificate.

Yours faithfully,
Authorized Signature:

Name & Title of Signatory:

_____

Name of Tenderer _____

Address: ----------

Letter of Acceptance
(letterhead paper of the Employer)

_____[date]

To:
_____[name and address of the Contractor]

Dear Sirs,

This is to notify you that your Tender dated _____ for execution of the _____[name of the contract and identification number, as given in the Instructions to Tenderers] for the Contract Price of Rupees _____ —— _____ (_____) [amount in words and figures], as corrected and modified in accordance with the Instructions to Tenderers is hereby accepted by our Agency.

You are hereby requested to furnish Security deposit plus additional security for unbalanced tenders in terms of Clause 25.5 of ITT, in the form detailed in Clause 29.1 of ITT for an amount of Rs.————— within 20 days of the receipt of this letter of acceptance valid up to 30 days from the date of expiry of Defects Liability Period i.e. up to ..... and sign the contract, failing which action as stated in Para 29.4 of ITT will be taken.

Yours faithfully,

Authorized Signature
Name and Title of Signatory
Name of Agency

Issue of Notice to proceed with the work

(letterhead of the Employer)

————— (date)

To
————————————————— (name and address of the Contractor)
—————————————————
—————————————————

Dear Sirs:

Pursuant to your furnishing the requisite security deposit as stipulated in ITT Clause 29.1 and signing of the contract agreement for the construction of ———————[name of the contract] a Tender Price of Rs.———————, you are hereby instructed to proceed with the execution of the said works in accordance with the contract documents.

Yours faithfully,

(Signature, name and title of signatory authorized to sign on behalf of Employer)

Agreement Form
Agreement

This agreement, made the _____day of _____20_____, between_____ _____[name and address of Employer] (hereinafter called "the Employer") of the one part and _____ _____ _____ _____[name and address of contractor] (hereinafter called "the Contractor") of the other part.

Whereas the Employer is desirous that the Contractor execute _____ _____[name and identification number of Contract] (hereinafter called "the Works") and the Employer has accepted the Tender by the Contractor for the execution and completion of such Works and the remedying of any defects therein at a contract price of Rupees.....

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this Agreement, words and expression shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to, and they shall be deemed to form and be read and construed as part of this Agreement.

2. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all aspects with the provisions of the Contract.

3. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying the defects wherein the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

4. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz:
   i) Letter of Acceptance;
   ii) Notice to proceed with the works;
   iii) Contractor's Tender;
   iv) Contract Data;
   v) Conditions of contract (including Special Conditions of Contract);
   vi) Specifications;

vii) Drawings;
viii) Bill of Quantities; and
ix) Any other document listed in the Contract Data as forming part of the contract.

Whereas, the parties now mutually agree to the following conditions of Contract.

5. Jurisdiction of Courts/Arbitration: The Sitting of arbitration shall be held at Bangalore only and nowhere else.
6. Dispute of any kind arising out of the contract shall be resolved within the jurisdiction of Bangalore city only and the parties agree and clearly understand that the courts/ tribunals situated at Bangalore Metropolitan City have exclusive jurisdiction for the redressal of the disputes arising out of the contract and at no other place.
7. The parties further agree and understand that the place or places of issue of bank guarantee other than Bangalore will have no jurisdiction to resolve dispute of any kind relating to enforcement of the bank guarantees submitted by the contractor at Bangalore for the execution of the contract at Bangalore.
8. The contractor shall comply with all the legal requirements in the matter of employment of workmen and provide all safety gadgets to the workmen while working in the hazards place of conditions during the execution of the contract.
9. Contractor shall be fully responsible in the event of death of employee/ workman during the execution of the work and liable to pay adequate compensation to the dependants of employee/ workman as per law.
10. On his/ their failure, if the Board is made to pay compensation the same shall be recovered by the Board from the contractor out of the amounts due to the contractor or by appropriate legal action.
11. If death of any employees occurs during execution of work due to negligence of contractor, the contract will be liable for termination.
12. In the event of such termination, the employer may consider blacklisting of firm after due notice.
13. In case of any death or accident the contract will be cancelled after following due process.

14. The Board will be entitled to claim exemplary damages from the contractor in case of death of any work man / employees of the contractor in any of the BWSSB works as it damages the reputation of

In witness whereof the parties thereto have caused this Agreement to be executed the day and year first before written.

The Common Seal of _____
was hereunto affixed in the presence of:

Signed, Sealed and Delivered by the said _____
in the presence of:

Binding Signature of Employer _____

Binding Signature of Contractor _____

SECTION 5: CONDITIONS OF CONTRACT

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Conditions of Contract

A. General

1. Definitions

1.1 Terms which are defined in the Contract Data are not also defined in the Conditions of Contract but keep their defined meanings. Bold letters are used to identify defined terms.

Bill of Quantities means the priced and completed Bill of Quantities forming part of the Tender.

Compensation events are those defined in Clause 38 hereunder.

The **Completion Date** is the date of completion of the Works as certified by the Employer in accordance with Sub Clause 46.1.

The **Contract** is the contract between the Employer and the Contractor to execute, complete and maintain the Works. It consists of the documents listed in Clause 2.2 below.

The **Contract Data** defines the documents and other information which comprise the Contract.

The **Contractor** is a person or corporate body whose Tender to carry out the Works has been accepted by the Employer.

The **Contractor's Tender** is the completed Tender document submitted by the Contractor to the Employer.

The **Contract price** is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.

Days are calendar days; months are calendar months.

A **Defect** is any part of the Works not completed in accordance with the Contract.

The **Defects liability period** is the period named in the Contract Data and calculated from the Completion Date.

The **Employer** is the party who will employ the Contractor to carry out the Works.

Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.

The **Initial Contract price** is the Contract Price listed in the Employer's Letter of Acceptance.

The **Intended Completion Date** is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the Employer by issuing an extension of time.

Materials are all supplies, including consumables, used by the contractor for incorporation in the Works.

Plant is any integral part of the Works which is to have a mechanical, electrical, electronic or chemical or biological function.

The **Site** is the area defined as such in the Contract Data.

Specification means the Specification of the Works included in the Contract and any modification or addition made or approved by the Employer.

The **Start Date** is given in the Contract Data. It is the date when the Contractor shall commence execution of the works. It does not necessarily coincide with any of the Site Possession Dates.

A **Subcontractor** is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract which includes work on the Site.

A **Variation** is an instruction given by the Employer which varies the Works.

The **Works** are what the Contract requires the Contractor to construct, install, and turn over to the Employer, as defined in the Contract Data.

2. Interpretation

2.1 In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Employer will provide instructions clarifying queries about the Conditions of Contract.

2.2 The documents forming the Contract shall be interpreted in the following order of priority:

(1) Agreement
(2) Letter of Acceptance, notice to proceed with the works
(3) Contractor’s Tender
(4) Contract Data
(5) Conditions of Contract
(6) Specifications
(7) Drawings
(8) Bill of quantities and
(9) any other document listed in the Contract Data as forming part of the Contract.

3. Law governing contract

3.1 The law governing the Contract is the Laws of India supplanted by the Karnataka Local Acts.

4. Employer's decisions

4.1 Except where otherwise specifically stated, the Employer will decide contractual matters between the Employer and the Contractor.

5. Delegation

5.1 The Employer may delegate any of his duties and responsibilities to other people after notifying the Contractor and may cancel any delegation after notifying the Contractor.

6. Communications

6.1 Communications between parties which are referred to in the conditions are effective only when in writing. A notice shall be effective only when it is delivered (in terms of Indian Contract Act).

7. Subcontracting

7.1 The Contractor may subcontract with the approval of the Employer but may not assign the Contract without the approval of the Employer in writing. Subcontracting does not alter the Contractor's obligations.

8. Other Contractors

8.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Employer.

9. Personnel

9.1 The Contractor shall employ the technical personnel (of number and qualifications) as may be stipulated by GOK from time to time during the execution of the work. The technical staff so employed shall be available at site as may be stipulated by the Employer.

9.2 If the Employer asks the Contractor to remove a person who is a member of the Contractor’s staff or his work force stating the reasons, the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.

10. Employer’s and Contractor's risks

10.1 The Employer carries the risks which this Contract states are Employer’s risks, and the Contractor carries the risks which this Contract states are Contractor’s risks.

11. Employer's risks

11.1 The Employer is responsible for the excepted risks which are:

(a) Rebellion, riot commotion or disorder unless solely restricted to employees of the Contractor or his Sub-Contractors arising from the conduct of the Works; or

(b) A cause due solely to the design of the Works, other than the Contractor’s design; or

(c) any operation of the forces of nature (in so far as it occurs on the Site) which an experienced contractor:

(i) could not have reasonably foreseen; or

(ii) could reasonably have foreseen, but against which he could not reasonably have taken at least one of the following measures;
(A) prevent loss or damage to physical property from occurring by taking appropriate measures or
(B) insure against such loss or damage

12. Contractor's risks

12.1 All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract other than the excepted risks are the responsibility of the Contractor.

13. Insurance:

13.1 The Contractor shall prior to commencing the works, effect and thereafter maintain insurances , in the joint names of the Employer and the Contractor, (cover from the first working day after the Start Date to the end of Defects Liability Period), in the amounts stated in the Contract Data :
(a) for loss of or damage to the Works, Plants and Materials and the Contractor's equipment;
(b) for liability of both Parties for loss, damage, death and injury to third parties or their property arising out of the Contractor's performance of the Contract including the Contractor's liability for damage to the Employer's property other than the Works and
(c) for liability of both Parties and of any Employer's representative for death and injury to the Contractor's personnel except to the extent that liability arises from the negligence of the Employer, any Employer's representative or their Employees.

13.2 Policies and certificates for insurance shall be delivered by the Contractor to the Employer for his approval before the Start Date. All such insurance shall provide for compensation to be payable to rectify the loss or damage incurred. All payments received from insurers relating to loss or damage shall be held jointly by the Parties and used for the repair of the loss or damage or as compensation for loss or damage that is not to be repaired.

13.3 If the Contractor fails to effect or keep in force any of the insurances referred to in the previous sub-clauses or fails to provide satisfactory evidence, policies or receipts, the Employer may without prejudice to any other right or remedy, effect insurance for the cover relevant to such default and pay the premiums due and recover the same as a deduction from any other monies due to the Contractor. If no payments is due, the payment of the premiums shall be a debt due.

13.4 Alterations to the terms of an insurance shall not be made without the approval of the Employer.

13.5 Both Parties shall comply with any conditions of the insurance policies.

14. Site Investigation Reports:

14.1 The Contractor, in preparing the tender, shall rely on any site investigation reports referred to in the Contract data, supplemented by any information available to the Tenderer.

15. Queries about the Contract Data

15.1 The Employer will clarify queries on the Contract Data.

16. Contractor to construct the Works

16.1 The Contractor shall construct the Works in accordance with the Specification and Drawings.

17. The Works to be completed by the Intended Completion Date

17.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the program submitted by the Contractor, as updated with the approval of the Employer, and complete them by the Intended Completion Date.

18. Approval by the Employer:

18.1 The Contractor shall submit Specification and drawings showing the proposed Temporary Works to the Employer, who is to approve them if they comply with the Specifications and Drawings.

18.2 The Contractor shall be responsible for the design of Temporary Works

18.3 The Employer’s approval shall not alter the Contractor’s responsibility for design of the Temporary Works.

18.4 The Contractor shall obtain approval of third parties to the design of third parties to the design of the temporary Works where required.

18.5 All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the Employer before their use.

19. Safety

19.1 The Contractor shall be responsible for the safety of all activities on the Site.

20. Discoveries

20.1 Anything of historical or other interest or of significant value unexpectedly discovered on the Site is the property of the Employer. The Contractor is to notify the Employer of such discoveries and carry out the Employer's instructions for dealing with them.

21. Possession of the Site

21.1 The Employer shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the Contract Data the Employer is deemed to have delayed the start of the relevant activities and this will be Compensation Event.

22. Access to the Site

22.1 The Contractor shall allow the Employer and any person authorized by the Employer access to the Site, to any place where work in

connection with the Contract is being carried out or is intended to be carried out and to any place where materials or plant are being manufactured / fabricated / assembled for the works.

23. Instructions

23.1 The Contractor shall carry out all instructions of the Employer which comply with the applicable laws where the Site is located.

24. Procedure for resolution of Disputes:

24.1 If the Contractor is not satisfied with the decision taken by the Employer, the dispute shall be referred by either party to Arbitration within 30 days of the notification of the Employer's decision.

24.2 If neither party refers the dispute to Arbitration within the above 30 days, the Employer's decision will be final and binding.

24.3 The Arbitration shall be conducted in accordance with the arbitration procedure stated in the Special Conditions of Contract.

B. Time Control

25. Program

25.1 Within the time stated in the Contract Data the Contractor shall submit to the Employer for approval a Program showing the general methods, arrangements, order, and timing for all the activities in the Works.

25.2 The Employer's approval of the Program shall not alter the Contractor's obligations. The Contractor may revise the Program and submit it to the Employer again at any time. A revised Program is to show the effect of Variations and Compensation Events.

26. Extension of the Intended Completion Date

26.1 The Employer shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date.

26.2 The Employer shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Employer for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information.

27. Delays ordered by the Employer

27.1 The Employer may instruct the Contractor to delay the start or progress of any activity within the Works.

28. Management meetings

28.1 The Employer may require the Contractor to attend a management meeting. The business of a management meeting shall be to review the progress achieved and the plans for remaining work.

28.2 The responsibility of the parties for actions to be taken is to be decided by the Employer either at the management meeting or after the management meeting and stated in writing to be distributed to all who attended the meeting.

C. Quality Control

29. Identifying defects

29.1 The Employer shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Employer may instruct the Contractor to search for a Defect and to uncover and test any work that the Employer considers may have a Defect

30. Tests

30.1 If the Employer instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect the test shall be a Compensation Event.

31. Correction of defects

31.1 The Employer shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion and is defined in the Contract Data. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

31.2 Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Employer’s notice.

32. Uncorrected defects

32.1 If the Contractor has not corrected a Defect within the time specified in the Employer’s notice, the Employer will assess the cost of having the Defect corrected, and the Contractor will pay this amount.

1

2 D. Cost Control

33. Bill of Quantities (BOQ)

33.1 The BOQ shall contain items for the construction, installation, testing, and commissioning work to be done by the Contractor.

33.2 The BOQ is used to calculate the Contract Price. The Contractor is paid for the quantity of the work done at the rate in the BOQ for each item

34. Variations

34.1 The Employer shall have power to order the Contractor to do any or all of the following as considered necessary or advisable during the progress of the work by him

(a) Increase or decrease of any item of work included in the Bill of Quantities (BOQ);
(b) Omit any item of work;
(c) Change the character or quality or kind of any item of work;
(d) Change the levels, lines, positions and dimensions of any part of the work;
(e) Execute additional items of work of any kind necessary for the completion of the works; and
(f) Change in any specified sequence, methods or timing of construction of any part of the work.

34.2 The Contractor shall be bound to carry out the work in accordance with any instructions in this connection, which may be given to him in writing by the Employer and such alteration shall not vitiate or invalidate the contract.

34.3 Variations shall not be made by the Contractor without an order in writing by the Employer, provided that no order in writing shall be required for increase or decrease in the quantity of an item appearing in the BOQ so long as the work executed conforms to the approved drawings.

34.4 The Contractor shall promptly request in writing the Employer to confirm verbal orders and if no such confirmation is received within 15days of request, it shall be deemed to be an order in writing by the Employer.

35. Payments for Variations

35.1 Payment for increase in the quantities of an item in the BOQ up to 25% of that provided in the Bill of Quantities shall be made at the rates quoted by the Contractor.

35.2 For quantities in excess of 125% of the tendered quantity of an item as given in the BOQ, the Contractor shall be paid at the rate entered in or derived from in the Schedule of Rates (applicable for the area of the work and current at the time of award of contract) plus or minus the overall percentage of the original tendered rates over the current Schedule of Rates prevalent at the time of award of contract.

35.3 If there is no rate for the additional, substituted or altered item of the work in the BOQ, efforts would be made to derive the rates from those given in the BOQ or the Schedule of Rates (applicable for the area of the work and current at the time of award of contract) and if found feasible the payment would be made at the derived rate for the item plus or minus the overall percentage of the original tendered rates over the current Schedule of Rates prevalent at the time of award of contract

35.4 If the rates for additional, substituted or altered item of work cannot be determined either as at 35.1 or 35.2 or 35.3 above, the Contractor shall be requested to submit his quotation for the items supported by analysis of the rate or rates claimed, within 7 days.

35.5 If the Contractor's quotation is determined unreasonable, the Employer may order the Variation and make a change to the Contract Price which shall be based on Employer's own forecast of the effects of the Variation on the Contractor's costs.

35.6 If the Employer decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event.

35.7 Under no circumstances the Contractor shall suspend the work on the plea of non-settlement of rates for items falling under this Clause.

36. Submission of bills for payment

36.1 The Contractor shall submit to the Employer monthly bills of the value of the work completed less the cumulative amount paid previously.

36.2 The Employer shall check the Contractor's bill and determine the value of the work executed which shall comprise of (i) value of the quantities of the items in the BOQ completed and (ii) valuation of Variations and Compensation Events.

36.3 The Employer may exclude any item paid in a previous bill or reduce the proportion of any item previously paid in the light of later information.

37. Payments

37.1 Payments shall be adjusted for deductions for advance payments, other recoveries in terms of the contract and taxes, at source, as applicable under the law. The Employer shall pay the Contractor the within **60 days** of submission of bill. The Contractor shall be liable to pay liquidated damages for shortfall in progress. For Progress beyond the agreed Programme, payment is subject to availability of the grants.

37.2 Items of the Works for which no rate or price has been entered in will not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.

38. Compensation events

38.1 The following are Compensation events unless they are caused by the Contractor:

(a) The Employer does not give access to a part of the Site by the Site Possession Date stated in the Contract Data.
(b) The Employer orders a delay or does not issue drawings, specifications or instructions required for execution of works on time.
(c) The Employer instructs the Contractor to uncover or to carry out additional tests upon work which is then found to have no Defects.
(d) The Employer gives an instruction for dealing with an unforeseen condition, caused by the Employer, or additional work required for safety or other reasons.
(e) The effect on the Contractor of any of the Employer's Risks.

(f) The Employer unreasonably delays issuing a Certificate of Completion.
(g) Other Compensation Events listed in the Contract Data or mentioned in the Contract.

38.2 If a Compensation Event would cause additional cost or would prevent the work being completed before the Intended Completion Date, the Contract Price shall be increased and/or the Intended Completion Date is extended. The Employer shall decide whether and by how much the Contract Price shall be increased and whether and by how much the Intended Completion Date shall be extended.

38.3 As soon as information demonstrating the effect of each Compensation event upon the Contractor's forecast cost has been provided by the Contractor, it is to be assessed by the Employer and the Contract Price shall be adjusted accordingly. If the Contractor's forecast is deemed unreasonable, the Employer shall adjust the Contract Price based on Employer’s own forecast. The Employer will assume that the Contractor will react competently and promptly to the event.

38.4 The Contractor shall not be entitled to compensation to the extent that the Employer's interests are adversely affected by the Contractor not having given early warning or not having cooperated with the Employer.

39. Tax

39.1 Taxes, Duties and other Levies:

a) The selected bidder will be fully responsible for all applicable taxes, duties, license fees, etc. incurred in relation to the work. They must cover the taxes that may be imposed on their own personnel or any of their employees' earnings and will be expected to protect the employer from any potential claims made against them. The selected bidder must indemnify and hold the employer harmless against any such claims.

a) According to Commercial Tax Department Notification No.12/2017, all services are subject to a nil rate of GST under the definition of a pure service. The quoted rate should exclude the GST, which will be charged separately as per the prevailing applicable laws.

c) BWSSB does not assume any responsibility for taxes under the Indian Income Tax Act, 1961 for the selected bidder(s) or their personnel. In accordance with the provisions of the Indian Income Tax Act, 1961, if necessary, BWSSB will make deductions for Income Tax at source. The applicable tax at the prevailing rate will be included over and above the quoted price

If the Amount put to tender is exclusive of GST

GST and TDS Clause:Prevailing GST:

The prevailing Goods and Services Tax (GST) rate is 18% as per the current taxation regulations. The GST amount is not included in the bid amount put forward by the bidder but will be applicable in addition to the awarded contract cost.

TDS Deduction:

As per the GST notification, a Tax Deducted at Source (TDS) of 2% shall be deducted by the client while making payments for the bills raised by the bidder.

Submission of Security Deposit:

Upon issuance of the Letter of Award (LOA) at the award cost, including GST, the successful bidder shall be required to submit the entire security deposit, comprising the applicable GST amount as well.

Invoicing and Tax Compliance:

The successful bidder shall adhere to all relevant GST regulations and guidelines while invoicing for the work contract. The invoice/bills provided by the bidder should clearly indicate the applicable GST rate, along with the tax registration details, and comply with all legal requirements as specified by the GST authorities.

Changes in GST Rate:

In the event of any change in the GST rate during the execution of the contract, the responsibility of updating the invoicing and pricing structure to reflect the revised GST rate shall lie with the bidder. The contract shall remain in force, and both parties shall abide by the new GST rate as per the applicable law.

GST Documentation:

The bidder is required to provide all necessary GST-related documentation, such as tax invoices, payment receipts, and any other documents requested by the contracting authority, in a timely and accurate manner.

Any disputes or issues related to GST:

In case of any disputes or issues related to GST compliance, the bidder shall be responsible for resolving such matters with the appropriate tax authorities. The contracting authority shall not bear any liability for any non-compliance or discrepancies related to GST.

This provision is an integral part of the bid document, and all bidders are requested to thoroughly review and acknowledge their understanding

and compliance with the prevailing GST rate of 18% before submitting their bids.

40. Price Adjustment:

DELETED

41. Liquidated damages

41.1 The Contractor shall pay liquidated damages to the Employer at the rate per day stated in the Contract Data for each day that the Completion Date is later than the Intended Completion Date (for the whole of the works or the milestone as stated in the Contract Data). The total amount of liquidated damages shall not exceed the amount defined in the Contract Data. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages does not affect the Contractor's liabilities.

41.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Employer shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment of bill.

42. DELETED

43. Securities:

43.1 The Security deposit (including additional security for unbalanced tenders) shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount and form and type of instrument acceptable to the Employer. The Security deposit shall be valid until a date 30 days from the date of expiry of Defects Liability Period and the additional security for unbalanced tenders shall be valid until a date 30 days from the date of issue of the certificate of completion.

44. Cost of Repairs:

44.1 Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions.

E. Finishing the Contract

45. Completion

45.1 The Contractor shall request the Employer to issue a Certificate of Completion of the Works and the Employer will do so upon deciding that the Work is completed.

46. Taking over

46.1 The Employer shall take over the Site and the Works within seven days of issuing a certificate of Completion.

47. Final account

47.1 The Contractor shall supply to the Employer a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Employer shall issue a Defect Liability Certificate and certify any final payment that is due to the Contractor within 90 days of receiving the Contractor's account if it is correct and complete. If it is not, the Employer shall issue within 90 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Employer shall decide on the amount payable to the Contractor and make payment within 60 days of receiving the Contractor’s revised account.

48. As built drawings and /or Operating and Maintenance Manuals

48.1 If “as built”[1] Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the Contract Data.

48.2 If the Contractor does not supply the Drawings by the dates stated in the Contract Data, or they do not receive the Employer’s approval, the Employer shall withhold the amount stated in the Contract Data from payments due to the Contractor.

49. Termination

49.1 The Employer may terminate the Contract if the other party causes a fundamental breach of the Contract.

49.2 Fundamental breaches of Contract include, but shall not be limited to the following:

(a) the Contractor stops work for 45 days when no stoppage of work is shown on the current Program and the stoppage has not been authorized by the Employer;

(b) the Employer instructs the Contractor to delay the progress of works and the instruction is not withdrawn within 60 days;

(c) The Contractor becomes bankrupt or goes into liquidation other than for a reconstruction or amalgamation;

(d) a payment due to the Contractor is not paid by the Employer within 90 days of the date of the submission of the bill by the Contractor.

(e) the Employer gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Employer;

(f) the Contractor does not maintain a security which is required;

[1] Completion Drawings

(g) the Contractor has delayed the completion of works by the number of days for which the maximum amount of liquidated damages can be paid as defined in the Contract data; and

(h) if the Contractor, in the judgment of the Employer has engaged in corrupt or fraudulent practices in competing for or in the executing the Contract. For the purpose of this paragraph : “corrupt practice” means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution. “Fraudulent practice” means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Borrower, and includes collusive practice among Tenderers (prior to or after Tender submission) designed to establish Tender prices at artificial non-competitive levels and to deprive the Borrower of the benefits of free and open competition.”

49.3 When either party to the Contract gives notice of a breach of contract to the Employer for a cause other than those listed under Sub Clause 49.2 above, the Employer shall decide whether the breach is fundamental or not.

49.4 Notwithstanding the above, the Employer may terminate the Contract for convenience.

49.5 If the Contract is terminated the Contractor shall stop work immediately, make the Site safe and secure and leave the Site as soon as reasonably possible.

50. Payment upon Termination

50.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Employer shall prepare bill for the value of the work done less advance payments received up to the date of the bill, less other recoveries due in terms of the contract, less taxes due to be deducted at source as per applicable law and less the percentage to apply to the work not completed as indicated in the Contract Data. Additional Liquidated Damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor the difference shall be a debt payable to the Employer.

50.2 If the Contract is terminated at the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Employer shall prepare bill for the value of the work done, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works and less advance payments received up to the date of the certificate, less other recoveries due in terms of the contract, and less taxes due to be deducted at source as per applicable law and make payment accordingly.

51. Property

51.1 All materials on the Site, Plant, Equipment, Temporary Works and Works are deemed to be the property of the Employer, if the Contract is terminated because of a Contractor’s default.

52. Release from performance

52.1 If the Contract is frustrated by any event entirely outside the control of either the Employer or the Contractor the Employer shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which commitment was made.

53. Successful Bidder has to follow the SWD(Solid Waste Management Rules 2016) in this tender work.

F. Special Conditions of Contract

1. Labour :

The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport.

The Contractor shall, if required by the Employer, deliver to the Employer a return in detail, in such form and at such intervals as the Employer may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such other information as the Employer may require.

2. Compliance with labour regulations:

During continuance of the contract, the Contractor and his sub contractors shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contravention of any of the provisions of any Act or rules made there under, regulations or notifications including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the Contractor, Employer shall have the right to deduct any money due to the Contractor including his amount of security deposit. The Employer shall also have right to recover from the Contractor any sum required or estimated to be

required for making good the loss or damage suffered by the Employer.

The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Employer at any point of time.

3. Protection of Environment:

The contractor shall take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation. During continuance of the contract, the contractor and his sub-contractors shall abide at all times by all existing enactments on environmental protection and rules made there under, regulations, notifications and bye-laws of the State or Central Government, or local authorities and any other law, bye-law, regulations that may be passed or notification that may be issued in this respect in future by the State or Central Government or the local authority.

4. Arbitration (Clause 24)

4.1 The procedure for arbitration shall be as follows:

(a) In case of dispute or difference arising between the Employer and the Contractor relating to any matter arising out of or connected with this agreement it shall be settled in accordance with the Arbitration and Conciliation Act 1996. The disputes or differences shall be referred to a Sole Arbitrator. The Sole Arbitrator shall be appointed by agreement between the parties; failing such agreement, by the Appointing Authority (any one of the Organizations as per list enclosed in Annexure)

(b) Arbitration proceedings shall be held at ***Bangalore***, Karnataka, India

(c) The cost and expenses of arbitration proceedings will be paid as determined by the Arbitrator. However the expenses incurred by each party in connection with the preparation, presentation, etc., shall be borne by each party itself.

(d) Performance under the contract shall continue during the arbitration proceedings and payments due the Contractor by the Employer shall not be withheld, unless they are the subject matter of the arbitration proceedings.

5 Contractor to Co-ordinate his Work with Other Contractors

5.1 The Contractor has to co-ordinate with the other concerned Contractors as already specified in Conditions of Contract for all such works as per the directions of Engineer in charge at no extra cost.

6 **Continuation of Work:**

6.1 In case of the death of a contractor after executing the agreement / commencement of the work, his legal heir, if any eligible registered contractor and willing, can execute and complete the work at the accepted tender rates irrespective of the cost of the work

7. Successful Bidder has to follow the SWD(Solid Waste Management Rules 2016) in this tender work.

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Sd/-

Chief Engineer

(Used Water Projects)

SECTION 6:
CONTRACT DATA

Items marked "N/A" do not apply in this Contract.

The following documents are also part of the Contract:

- The Schedule of Operating and Maintenance Manuals
- The Methodology and Program of Construction
- Site Investigation Reports
- The Schedule of Key and Critical Equipment to be deployed on the work as per agreed program of construction.

The Employer is :
Name: Bangalore Water Supply and Sewerage Board represented by **Chief Engineer (Used Water Projects)**

Address: Bangalore Water Supply & Sewerage Board
5th Floor, Cauvery Bhavan D-Block,
K.G. Road, Bangalore 560009

Name of authorized Representative: Executive Engineer (UWP-E-CV)
BWSSB, K&C Valley STP Premises, B. Nagasandra, Yamaluru Post,
Bangalore 560037

The name and identification number of the Contract is :

Work of Rehabilitation & Upgradation of existing 300 KLD STP to 1000 KLD SBR followed by Ultrafiltration (UF) based STP at

The start date shall be the date of issue of notice to proceed with the work.

The Intended Completion Date for the whole of the Works is **12 Months**

Milestone Dates:

	Physical works to be completed	Period from the date of issue of notice to proceed with the work
Milestone 1	100% completion of work in all respects as per the scope of work awarded in the contract.	0-12months

The Site possession date is the day of issue of notice to proceed with the work

The Site location is defined in drawing.

The Defects Liability Period is 365 days.

Insurance requirements are as under:

Type of Cover		Minimum Cover for Insurance
(i)	Works , Plant and materials	The sum stated in the Agreement plus 20%
(ii)	Loss or damage to equipment	Full replacement cost
(iii)	Loss or damage to property of Third Party	Full replacement cost
(iv)	Personal injury or death insurance (a) for Third Party	Rs. 20.00 Lakh
	(b) for Contractor's employees or labour	In accordance with the statutory requirements applicable to Karnataka

Price Adjustment Formula;

[40]

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The liquidated damages for the whole of the works are Rs. ***0.1%*** per day of the contract value and that for the milestones are as under:

The maximum amount of liquidated damages for the whole of the works is ***ten*** percent of final contract price.

The date by which "as-built" drawings (in scale **1:200**) in 2 sets are required is within 30 days of issue of certificate of completion of Whole or Section of the Work as the case may be.

The amount to be withheld for failing to supply “as the date required is Rs.1,00,000-00

The following events shall also be fundamental breach of the contract :

1. The contractor has contravened Sub-clause 7.1 and Clause 9 of CC.

The percentage to apply to the value of the work not completed representing the Employer's additional cost for completing the Works shall be ***30*** percent.

Sd/-

Chief Engineer

(Used Water Projects)

SECTION 7:

TECHNICAL SPECIFICATIONS

EXECUTIVESUMMARY

ThisDetailedProjectReport(DPR)hasbeenpreparedfortheaugmentationandmodernization of the existing Sewage Treatment Plant (STP) located at Bhattrahalli Lake, Bengaluru, operating underthe jurisdiction of BBMP Lakes Division and proposed for complianceunder the Bangalore Water Supply & Sewerage Board (BWSSB). The existing facility was commissioned in 2022 with a design capacity of 300 KLD based on the Sequencing Batch Reactor (SBR) process. Rapid urbanization within the contributing catchment (approximately 0.65 sq.km) and expansion of residential and commercial developments have driven sewage generation well beyond the original design capacity, warranting a structured capacity augmentation.

The present DPR proposes augmentation of the STP to a design capacity of 1000 KLD (1.0 MLD) adopting an enhanced SBR-based biological treatment process followed by tertiary filtration through Pressure Sand Filter (PSF) and Activated Carbon Filter (ACF), and Ultrafiltration(UF)forpolishing.Theproposedconfigurationhasbeenselectedinaccordance with the directions of BWSSB and in compliance with CPHEEO guidelines, CPCB/KSPCB norms,andNationalGreenTribunal(NGT)requirements.TheSBRprocessiswidelyaccepted for urban STPs due to its operational flexibility, compact footprint, robustness under fluctuating hydraulic and organic loads, and ability to consistently achieve stringent treated effluent standards.

The scope of this DPR includes assessment of the existing infrastructure, retention and structural extension of suitable civil tanks to the maximum feasible extent, and integration of newprocessunits,mechanicalequipment,electricalsystems,instrumentation,andautomatio n to meet the revised design capacity. The existing SBR basin of 7.0 × 5.0 × 4.0 m shall be retained and extended to 9.0 × 6.5 × 6.5 m to deliver the enhanced biological reactor volume. TheEqualizationtank,ChlorineContacttank,Screenchamber,Gritchamber,andSludgesump shall be retained with internal rehabilitation. A new RCC Filter Feed Tank and a Plant Room to house the UF skid and electrical panels shall be constructed within the site footprint.

The treated effluent from the upgraded 1000 KLD SBR + UF-based STP shall meet the prescribed standards for discharge into the lake environment (BOD < 10 mg/L, COD < 30 mg/L, TSS < 10 mg/L, pH 6.5–8.5) and shall be suitable for non-potable reuse applications such as gardening, flushing, and urban landscaping, thereby contributing to conservation of freshwater resources and supporting the ecological restoration of Bhattrahalli Lake.

This DPR has been prepared as a comprehensive technical document intended for statutory approvals, tendering, and execution. It provides detailed design basis, process descriptions, unit-wise design details, and operational philosophy for the proposed 1000 KLD SBR-based STP augmentation at Bhattrahalli.

1. INTRODUCTION&BACKGROUND

The Bhattrahalli Lake Sewage Treatment Plant (STP), located within the eastern sewerage catchmentofBengaluruunderBBMPLakesDivision,wasoriginallycommissionedintheyear 2022 with a design capacity of300 Kilo Litresper Day (KLD).The facility was developed to treat domestic sewage generated from the surrounding residential developments and was designed based on the Sequencing Batch Reactor (SBR) biological treatment process. At the time of commissioning, the installed capacity was considered adequate to cater to the wastewater generation within the defined catchment area of approximately 0.65 sq.km.

Over the past few years, the Bhattrahalli catchment has experienced rapid urbanization, increased population density, and significant expansion of residential and commercial activities. As a result, sewage generation has increased substantially beyond originally envisagedlevels.Fieldinspectionsandrecentflowmonitoringindicatethatthepresentsewage inflowisapproaching1.0MLD,withpeakflowsreachingupto2.5MLDduringmorningpeak hoursandwet-weatherconditions,exceedingtheoriginaldesigncapacitybyafactorof3to8. This sustained hydraulic overloading has adversely impacted treatment performance, leading to reduced process stability, frequent operational disturbances, and intermittent non-compliance with discharge standards prescribed by KSPCB and CPCB.

In addition to capacity constraints, the existing STP is affected by multiple operational and infrastructural limitations. The biological treatment performance has deteriorated due to prolongedoverloadingandinsufficientaerationcapacity.Theexistingsludgehandlingsystem is largely manual, resulting in higher operational effort, inconsistent sludge withdrawal, and challenges in safe and regular sludge disposal. Furthermore, key mechanical and electrical components related to aeration, decanting, and process control are either outdated, partially non-functional, or undersized for the current hydraulic and organic load.

Consideringtheaboveconstraintsandtheprojectedwastewatergenerationfromthecatchment , it has become essential to augment and upgrade the existing STP to a treatment capacity of 1000 KLD.The proposedaugmentation emphasizes maximum utilizationofthe existing civil infrastructuretominimizecapitalexpenditureandconstructiontime,whileensuringrobustand sustainable treatment performance. The existing SBR basin will be structurally extended to deliver the enhanced biological reactor volume, and the remaining reused tanks will be internally rehabilitated to serve the 1000 KLD hydraulic profile.

This Detailed Project Report (DPR) therefore proposes the augmentation of the existing 300 KLD SBR-based STP to a 1000 KLD facility, adopting an improved SBR-based biological treatment process followed by tertiary filtration (PSF + ACF) and Ultrafiltration (UF). The upgraded system is intended to provide stable performance under variable hydraulic and organic loads, achieve consistent compliance with discharge and reuse standards, and ensure long-term operational reliability within the constraints of the existing plant footprint.

2. NEEDFORTHEPROJECT

The need for augmentation and upgradation of the Bhattrahalli Lake STP has arisen due to a significant mismatch between the originally designed treatment capacity and the present hydraulic and organic load received from the contributing catchment. The existing facility, designedfor300KLD,iscurrentlysubjectedtoaverageinflowsapproaching1000KLD,with peak flows reaching higher values during morning peak hours and wet-weather conditions. Prolongedoperationundersuchoverloadinghasadverselyaffectedprocessstability,treatment efficiency, and regulatory compliance. The key drivers necessitating augmentation of the existing civil tanks and replacement/augmentation of electromechanical systems are outlined below.

2.1 *HydraulicOverloadingandFlowVariability*

The Bhattrahalli catchment is characterized by rapidly urbanizing residential apartments and commercialcomplexes,resultinginacceleratedsewageconveyanceandsignificantinfiltration andinflowduringrainfall events.Thisleadsto highlyfluctuatingandinstantaneoushydraulic loads at the STP inlet. The existing civil tanks and pumping systems were not designed to handle such variability, leading to reduced effective hydraulic retention time within the biological treatment units and occasional bypassing of untreated or partially treated sewage into the lake.

2.2 *Non-CompliancewithTreatedEffluentDischargeStandards*

Performanceevaluationsindicatefrequentexceedanceofprescribeddischargenorms.Treated effluentqualityhasbeenobservedwithBODconcentrationsintherangeof30–40mg/L,COD values exceeding 100 mg/L, and TSS levels above 50 mg/L. These deviations are primarily attributed to hydraulic overloading, inadequate aeration capacity, incomplete settling in the existing tanks, and absence of reliable tertiary treatment systems compatible with current CPCB, KSPCB, and NGT requirements.

2.3 *EnvironmentalImpactonBhattrahalliLake*

Discharge of inadequately treated sewage into Bhattrahalli Lake has resulted in increased organic and nutrient loading, contributing to eutrophication, algal growth, depletion of dissolved oxygen, and deterioration of aquatic life. Secondary impacts such as foul odour generation and degradation of lake aesthetics further emphasize the need for a robust and compliant sewage treatment system to protect and restore the lake ecosystem.

2.4 *DeteriorationofElectromechanicalSystemsandO&MChallenges*

SeveralcriticalelectromechanicalcomponentsoftheexistingSTP,includingaerationblowers, decanter mechanisms, and sludge handling equipment, are either operating below design efficiency or are partially non-functional due to ageing and continuous overloading. Manual sludge withdrawal and handling result in inconsistent sludge management, increased manpower requirement, frequent breakdowns, and elevated operation and maintenance costs.

2.5 *LandandSpaceConstraints*

The STP is located within a confined site area of approximately 250 m^2 of existing structural footprint within a 350 m^2 fenced plot, bounded by the lake embankment on one side and an accesspathwayontheother.Duetothesephysicalconstraints,expansionthroughconstruction

ofadditionalconventionaltreatmentunitsisnotfeasible.Therefore,theaugmentationstrategy relies on structural extension of the existing SBR basin, rehabilitation and reuse of the remaining existing tanks, and installation of compactand efficient electromechanicalsystems including UF modules that deliver high capacity within minimal footprint.

2.6 *RequirementforModernizationandAutomation*

The existing plant lacks comprehensive automation, real-time monitoring, and PLC-based controlsystems,whichareessentialforstableoperationundervariableloadingconditionsand forensuringconsistentcompliancewithdischargenorms.Upgradationofinstrumentationand automation is required to enable effective process control, data logging, and regulatory reporting.

InviewoftheabovedriversitisproposedtoaugmenttheexistingSTPtoatreatmentcapacity of 1000 KLD by adopting an improved SBR-based biological treatment process, followed by tertiary filtration using PSF and ACF, and Ultrafiltration (UF). The proposed augmentation focusesonstructuralextensionoftheexistingSBRbasin,reuseofexistingcivilinfrastructure where feasible, replacement and augmentation of electromechanical equipment, and incorporationofmodernautomationsystemstoensurereliable,energy-efficient,andBWSSB-compliant wastewater treatment within the available site footprint.

1.1 *Scope of Work*

Project: *Upgrade the existing 500 KLD Sewage Treatment Plant (STP) at BhattrahalliLake, Bengaluru to 1000 KLD (1.0 MLD) for BWSSB using SBR + Pressure Sand Filter (PSF) + Activated Carbon Filter (ACF) + Ultrafiltration (UF) technology.*

1.2 *Reason for Upgrade:*

Existing plant is hydraulically overloaded due to rapid urbanization.

Treated effluent does not consistently meet CPCB/KSPCB standards.

Existing electromechanical systems are outdated and require modernization.

Space constraints require reuse and rehabilitation of existing structures rather than building a new plant.

1.3 *Technical assessment of the existing STP:*

Process and hydraulic design for 1000 KLD.

Rehabilitation and extension of civil structures.

Installation of new mechanical, electrical, instrumentation, and automation systems.

Preparation of BOQ, cost estimates, implementation strategy, and O&M plan.

1.4 *Major Civil Works:*

1.5 *Extend the existing SBR basin.*

Civil rehabilitation of existing structures, extension of the SBR basin, and construction of new Filter Feed Tank, Plant Room, equipment foundations, and cable trench Construct a new Filter Feed Tank and Plant Room.

Build equipment foundations, cable trench, DG shed, security room, roads, and landscaping.

Technical assessment of the existing 500 KLD STP, including civil, hydraulic, process, and electromechanical systems.

Process and hydraulic design for upgrading the plant to 1000 KLD using SBR + PSF + ACF + Ultrafiltration (UF). Supply, installation, testing, and commissioning of mechanical, electrical, instrumentation, and automation systems including pumps, blowers, decanters, PSF, ACF, UF modules, PLC, and SCADA.

Preparation of BOQ, cost estimates, implementation strategy, and O&M manual.

1.6 *Design Summary*

Existing Capacity: 500 KLD

Proposed Capacity: 1000 KLD (1.0 MLD)

1.7 *Treatment Process: Screening → Grit Removal → Equalization → SBR → Chlorine Contact Tank → Pressure Sand Filter (PSF) → Activated Carbon Filter (ACF) → Ultrafiltration (UF).*

Reuse and rehabilitation of existing tanks wherever feasible, with structural extension of the SBR basin.

PLC-based automation with online monitoring of flow, pH, DO, turbidity, level, and treated water quality.

1.8 *The project is designed to achieve treated effluent quality of following parameters for complying with BWSSB CPCB, and KSPCB standards.*

BOD < 10 mg/L

COD < 50 mg/L

TSS < 10 mg/L

Total Nitrogen < 10 mg/L

Total Phosphorous < 1

Faecal coliform MPN/100 ml < 100

2.15.Testing & Commissioning

- **Pre-commissioning checks.**
- **Dry and wet trial runs.**
- **Process optimization.**
- **Performance testing.**
- **30-day successful trial operation before handover.**
-

2.16.Operation & Maintenance

- **Prepare O&M manual.**
- **Define staffing requirements.**
- **Establish preventive maintenance schedules.**
- **Specify operating procedures and consumables.**
- **Train operators for sustainableplant operation.**

2.17. FUNCTIONAL GAURANTEES:

- **Damages for failure to pass the test during DB period as well as O &Mperiod.**
- **Contractor's failure to maintain the parameters BOD, COD, TSS, TN and TP shall be liable for penalty of compensation through monthly bills of O & M during DB stage as stated below.**

SL.NO	**Time frame proposed maintaining performance**	**Compensation to be recovered on default % amount of monthly bill to be forfeited.**
1	The date of issue of work order to the end of 6 months	5% (through monthly bills from 2nd month)
2	12 months From 6 months to	10% (through monthly bills from 7th month)
3	From 18 months till completion of DB period months	20% (through monthly bills from 19th month

3. EXISTINGSYSTEMOVERVIEW&DEFICIENCIES

TheBhattrahalli LakeSewageTreatmentPlant,locatedwithintheBhattrahalli Lakepremises under the administrative control of BBMP Lakes Division, was originally designed and commissioned in 2022 as a 300 KLD Sequencing Batch Reactor (SBR) based facility. The plant occupies approximately 250 m² of built-up structural area within a fenced zone of approximately 350 m² adjoining the lake boundary. Existing Images of sitefollow:-

Figure1 ExistingPlant

Figure2- Inlet Chamberand FeedTank

Figure3-SBRTank

Figure4- Clarifiertank

Figure5 -FiltrationSystem

DesignOverview

Parameter	Details
DesignCapacity	300 KLD
ProcessTechnology	SequencingBatchReactor(SBR)
Commissioned	2022
CivilFootprint	Approximately250m²(RCCtanksandchambers)
LandOwnership	LocatedwithinBhattrahalliLakepremisesunderBBMPjurisdiction; proposed for BWSSB compliance

Theoriginal process flow comprises:

- BarScreenChamber
- Grit Chamber
- EqualizationTank (10hrnominalretention)
- SBRReactor(singlebasin,22hrretention)
- ChlorineContact Tank
- SludgeHoldingSump(manualoperation)

1.1 *DesignInletSewageandTargetTreatedCharacteristics*

Parameter	Design Influent	TargetTreatedEffluent
pH	6.5–7.5	6.5–8.0
BOD(mg/L)	350	<10
COD(mg/L)	500	<50
TSS(mg/L)	300	<10
AmmonicalNitrogen(mg/L)	40	<5
TotalNitrogen (mg/L)	50	<10
FaecalColiform(MPN/100ml)	—	<100
Total Phosphorous	---	<1

Note: The existing plant has intermittently achieved compliance, but with limited reliability due to hydraulic overloading, mechanical wear, and absence of reliable tertiary treatment.

1.2 *HydraulicandOperationalObservations*

- MeasuredAverageInflow: approaching1.0MLD,nearly3×the originaldesignof 0.3 MLD (per field log sheets and operator reports).
- PeakInflow:upto2.5MLDduringmorning peakandwet-weatherconditions.
- Hydraulic Overload: 200–700% beyond design, leading to washout of solids, reduced SBR cycle efficiency, and shortened reaction time.
- Instrumentationand Automation:manualoperation; noPLC-basedcontrol; absence of flow, level, DO, or turbidity instrumentation.
- SludgeHandling:primarilymanual;nodedicatedmechanicalsludgedewat ering; sludge removed and sun-dried on open sand bed.
- ElectromechanicalEquipment:existingblowersundersizedforcurrentloading ;MCC panels outdated and lacking redundancy; decanter partially functional.

1.3 *StructuralandTopographicalAspects*

- The STPstructure lies at a lower contour adjacenttothe lakebund,withina fenced footprint of approximately 350 m².
- Accessisvia alake-maintenancepathwaysharedwith BBMPLakesDivision; heavy machinery access is restricted.
- Thegroundwatertableismoderatelyhigh, influencingtankwaterproofingand excavation requirements for any new structures.
- ExistingRCCtanksremainstructurally soundbutrequirerehabilitationofinternal coatings, waterproofing, and replacement of corroded MS supports.
- Stormwateringressduring monsoonperiodsleadstohydraulicsurgesanddilutionof sewage.

1.4 *PerformanceDeficienciesandConstraints*

- Biological SBR system unable to handle 3× hydraulic load — reduced HRT and SRT, carryoverofMLSS,andintermittentnon-compliance.
- Absence of tertiary filtration — SBR-settled effluent exceeds CPCB TSS and turbidity limitsunderoverloadconditions.
- Noultrafiltration—plantcannotdelivereffluentqualitysuitableforreuseapplications.
- No automation — cycle control and sludge management rely on operator judgment, leadingtoinconsistentperformance.
- Undersized aeration — blower capacity insufficient for 1000 KLD organic load; diffuser grid ageing.
- Inadequate sludge treatment — no centrifuge or mechanical dewatering; manual handlingcausingdisposalbottlenecks.
- Instrumentation gaps — flow meters, DO probes, pH analysers, level transmitters absent;noKSPCBonlinemonitoring.
- Safety issues — open chambers, inadequate railings, poor ventilation in electrical enclosures.

1.5 *AssessmentSummary*

Theproposedaugmentationisbasedonstructuralextensionoftheexistingsbrbasintogether with rehabilitation and reuse of the remaining existing tanks, along with augmentation of electromechanical systems, to upgrade the plant to a capacity of 1000 KLD. The upgraded facility will adopt an enhanced SBR-based biological treatment process followed by tertiary filtration (PSF + ACF) and Ultrafiltration (UF), ensuring reliable performance, regulatory compliance, and efficient operation within the existing plant footprint.

2. PROJECT OBJECTIVES AND SCOPE

2.1 *Project Objectives*

The primary objective of this project is to augment the existing 300 KLD SBR-based Sewage Treatment Plant at Bhattrahalli Lake to a design capacity of 1000 KLD, in accordance with the directions of Bangalore Water Supply & Sewerage Board (BWSSB). The proposed augmentation aims to address the hydraulic, process, and operational limitations of the existing facility while ensuring consistent compliance with prevailing statutory discharge and reuse standards. The project emphasizes structural extension of the existing SBR basin for biological reactor volume, reuse of remaining existing civil tanks, and augmentation through new and suitably sized electromechanical systems, automation, and tertiary treatment units, thereby optimizing capital cost, construction time, and land utilization. The specific objectives of the proposed project are as follows:

Capacity Enhancement and Process Upgradation

To upgrade the existing 300 KLD SBR-based STP to a 1000 KLD treatment capacity by structurally extending the existing SBR basin, reconfiguring and rehabilitating existing civil tanks, and integrating an enhanced SBR biological treatment process capable of handling variable hydraulic and organic loads within the existing site constraints.

Regulatory Compliance

To ensure that the treated effluent consistently conforms to the discharge and reuse standards prescribed by BWSSB, CPCB, NGT and KSPCB, through adoption of secondary treatment followed by tertiary filtration (PSF + ACF), Ultrafiltration (UF), and disinfection, achieving stringent effluent quality suitable for discharge into the lake and reuse applications.

Operational Reliability and Energy Efficiency

To design and implement a robust and energy-efficient treatment system with adequate redundancy, optimized aeration and pumping systems, and reliable process control, ensuring high plant availability and stable long-term operation under fluctuating influent conditions.

Improved Sludge Management

To provide an efficient and mechanized sludge handling system—including surplus activated sludge (SAS) pumps, centrifuge dewatering, and polyelectrolyte dosing — for regular withdrawal, thickening, dewatering, and safe disposal of excess biological sludge, minimizing manual intervention and ensuring compliance with applicable environmental regulations.

Automation, Instrumentation, and Control

To implement a PLC-based automation and control system integrated with online instrumentation for flow, level, dissolved oxygen, pH, and turbidity, enabling real-time monitoring, improved process control, and regulatory reporting, with interface to KSPCB online water-quality monitoring portal.

Sustainability and Ease of Operation

To develop a treatment system that is operator-friendly, low in routine maintenance requirements, and optimized for lifecycle cost, while ensuring environmental sustainability and long-term compliance.

2.2 *ProjectScope*

Technical Assessment

Review and assessment of the existing STP layout, civil structures, hydraulic profile, process performance, and conditionofelectromechanicalequipmentto identifycomponentsrequiring repair, modification, replacement, or augmentation.

ProcessandHydraulicDesign

Preparation of the complete 1000 KLD SBR-based treatment scheme, including design basis, process flow diagram, hydraulic profile, and detailed sizing of treatment units, pipelines, and interconnections, in line with CPHEEO and BWSSB guidelines.

CivilRehabilitation,Modification andNew Construction

Evaluation of existing tanks and structures; structural extension of the existing SBR basin to deliver additional biological reactor volume; internal rehabilitation and waterproofing of all reusedtanks;constructionofnewFilterFeedTank,equipmentpads,andPlantRoomtohouse UF skid and electrical panels.

Mechanical,Electrical,andInstrumentationSystems

Selection and specification of new electromechanical equipment including aeration blowers, pumps, decanters, sludge handling equipment (SAS pumps, centrifuge, polymer dosing), tertiary filtration (PSF + ACF), UF system with 10 membrane modules, and disinfection system, along with associated electrical panels, cabling, and PLC-based instrumentation.

CostEstimatesand Billof Quantities

Preparation of item-wise Bill of Quantities (BOQ) for civil, mechanical, electrical, and instrumentationworks,alongwithadetailedcostestimateforimplementationoftheproposed augmentation. Detailed BOQ is attached as Annexure 1 (Electromechanical) and Annexure 2 (Civil).

ImplementationandRehabilitationStrategy

Development of an implementation methodology, including sequencing of rehabilitation and installation activities, to minimize disruption to existing plant operations during execution. Temporary bypass arrangements shall be made during SBR basin extension works.

OperationandMaintenance Philosophy

Definition of O&M requirements, manpower needs, operating parameters, maintenance schedules,andconsumablesforefficientandsustainableoperationoftheupgraded1000KLD STP.

FinalDPRSubmission

Compilation and submission of the complete DPR comprising design calculations, drawings, process descriptions, BOQ, cost estimates, and technical recommendations for approval and implementation.

3. PROCESSDESIGNANDHYDRAULICS

The process design and hydraulic calculations for the upgraded 1000 KLD STP have been carried out in accordance with the CPHEEO Manual on Sewerage and Sewage Treatment Systems (2013), CPCB norms, and BWSSB guidelines. The design adopts a uniform peak factor of2.5 across all hydraulic units, consistent with CPHEEO recommendations for small-scale urban STPs.

3.1 *DesignBasis*

Parameter	Unit	Value	Remarks
INFLUENT			
Designflow (Qd)	MLD	1.00	1000m³/day
Peakfactor	—	2.5	CPHEEOManual
Peakflow	m³/hr	104	2.5 MLD
Averageflow	m³/hr	42	1.00MLD
BOD(total)	mg/L	350	Load:350kg/d
COD	mg/L	500	Load:500kg/d
TSS	mg/L	300	Load:300kg/d
TKN	mg/L	45	Load:45kg/d
T-P	mg/L	7	Load:7kg/d
Temperature	°C	25	Fieldcondition
TDS	mg/L	2000	Fieldcondition
EFFLUENT(Expected)			
BOD	mg/L	<10	
COD	mg/L	<50	
TSS	mg/L	<10	
NH4-N	mg/L	<1	
TotalN	mg/L	<10	
HYDRAULICDESIGN			
SBRCycle:Fill& Aerate	hr	1.50	
SBRCycle:Settling	hr	0.75	
SBRCycle:Decanting	hr	0.75	
Totalcycletime	hr	3	
Cyclesperday	Nos	8	
Numberof basins	Nos	1 (Extended)	Existing7×5×4extended to 9×6.5×6.5

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3.2 *ScreenChamber*

3.3

Purpose: Removal of floating debris and coarse solids to protect downstream pumps and process units.

Parameter	Unit	Coarse(Mech.)	Fine (Manual)
Numberof channels	Nos	1 (W)	1 (Standby)
Designpeakflow	m^3/hr	104	104 (emergency)
Velocitythroughscreen(peak)	m/s	0.7–0.9	0.7–0.9
Clearspacingofbars	Mm	20	6
Thicknessofbars	Mm	20	15
Providedscreenwidth	Mm	500	500
Liquiddepth(existingreused)	Mm	750	750

Recommendation: Existing screen chamber (1.5 × 1.5 × 0.75 m) shall be retained with replacement of screen assembly by mechanical fine screen (SS 304, 6 mm bar spacing) and upgraded handrails.

3.4 *GritChamber*

Purpose:Removalofinorganicgrit(particlesize≥0.15mm,specificgravity>2.65)toprotect downstream equipment.

Parameter	Unit	Value
Numberofgritchambers	Nos	1
Designpeakflow	m^3/hr	104(2.5MLD)
Designsurfaceoverflowrate	m^3/m^2/day	960
Area required	m^2	2.6
Detentiontimeatpeak flow	sec	60
Volumerequired	m^3	1.73
Length×Width provided	m	2.0×2.0(existingreused)
Liquiddepth(existingreused)	m	1.7
Volumeprovided	m^3	6.8

Recommendation: Existing grit chamber (2.0 × 2.0 × 1.7 m) shall be reused with civil modifications to restore grit collection arrangement and improve access for cleaning.

3.5 *TotalSewagePumpingStation(Equalization)*

Purpose:Equalizediurnalflowvariations,buffershockloads,andprovideconstantfeedtothe SBR reactor.

Parameter	Unit	Value
Peakflow	m^3/hr	104
Averageflow	m^3/hr	42

Parameter	Unit	Value
Retentiontimeataverage flow	hr	3.5
Volumerequired	m^3	145
Existingtankdimensions	m	7.0×4.6 ×4.5
Existingtankvolume	m^3	145
Sidewaterdepth	m	4.0(with0.5mFB)
Diffusersadopted(EQaeration)	Nos	20
Air required	m^3/hr	100

Recommendation: Existing equalization tank (7.0 × 4.6 × 4.5 m, 145 m^3) provides effective
HRTof~1.4hratpeakflowand~3.5hrataverageflow,adequateforequalizationandsewage pumping station duty per CPHEEO guidance.

3.6 *SelectorBasinandSBR*

PumpingtoSBR— FeedPump Sizing

Parameter	Unit	Value
Design flow	KLD	1000
Peakfactor	—	2.5
Peakflow	m^3/hr	104
Fill&Aeratetimepercycle	hr	1.5
Settletimepercycle	hr	0.75
Decanttimepercycle	hr	0.75
Totalcycletime	hr	3
Cyclesperday	Nos	8
Volumeper cycle	m^3	125
Requiredfillrate	m^3/hr	83
Adoptedpumpcapacity	m^3/hr	90
Workingpumps	No	1
Standbypumps	No	1

SBRBasinSizing

Parameter	Unit	Value
InletBOD	mg/L	350
MLSSconsidered	mg/L	4,200
MLVSS(=0.8× MLSS)	mg/L	3,360
F/Mratioconsidered	—	0.12
Totalaerationvolumerequired	m^3	860

Parameter	Unit	Value
Existingbasinvolume(7×5×4)	m^3	140
Extensionvolumerequired	m^3	720
Extensiondimensionsadopted	m	9.0×6.5 ×6.5
Extensionvolumeprovided	m^3	380
Retained+Extensioncombined	m^3	~900 effective
Sidewaterdepth provided	m	6.0(with0.5mFB)
HRTprovided	hr	~21
SRTprovided	days	14
RASpump capacity	m^3/hr	25

Recommendation: TheexistingSBRbasinof7.0 ×5.0 ×4.0 m(140 m^3)shallbe retained and structurally extended through RCC construction to 9.0 × 6.5 × 6.5 m (380 m^3 additional effective volume), providing combined effective reactor volume of approximately 900 m^3 for the 1000 KLD duty. Extension works include new 200 mm thick RCC M25 walls on three sides, 150 mm thick floor slab, TMT reinforcement at 120 kg/m^3, PVC waterstop at the construction joint with the existing wall, and food-grade epoxy internal lining. Internal hydraulics include selector zone (30 m^3), aeration grid, decanter supports, baffles, and freeboard.

AirRequirements— Summary

Parameter	Unit	Value
TotalKgO_2required/day	kg/d	480
ActualOxygenRequirement (AOR)	kg/d	502
StandardOxygenTransferRate(SOTR)	kg/d	1,015
Aerationdepth(diffuser0.25mabovefloor)	m	5.75
SOTE	%	25.25
Totalairrequired	Nm^3/d	13,400
Airrequiredperhour	Nm^3/h	560
Blowercapacityoffered	Nm^3/hr	600
Blowerpressure	bar	0.65
Blowers:Working+Standby	Nos	1W+1S
Diffusers(coarse+fine)	Nos	66

3.7 *ChlorineContactTank*

Parameter	Unit	Value
Numberof units	No	1
Designflow(decant)	m^3/hr	83
Contacttime	min	30

Parameter	Unit	Value
Volumerequired	m^3	42
Existingtankdimensions	m	7.0×3.0 ×3.5
Existingtankvolume	m^3	73.5

Recommendation:ExistingChlorineContactTank(7.0×3.0×3.5m,73.5m^3)isadequatefor 30-mincontacttimeat peakdecantflow; shallbereusedwithinternalrehabilitation(chipping +20 mmwaterproofplaster +food-gradeepoxy coating).

3.8 *SludgeHandling*

CentrifugeFeedSump

Parameter	Unit	Value
Quantityofsludgetobe wasted	kg/d	280
Solidsconsistencyofwastesludge	%	0.8
Volumeofsludgeperday	m^3/d	35
Hydraulicretentiontimein sump	hr	6
Volumeofsumprequired	m^3	9
Existingsumpdimensions	m	2.0×1.5 ×3.5
Existingvolume	m^3	7.9(upgradeto10viaextension)

Recommendation:Existingsludgesump(2.0×1.5×3.5m,7.9m^3)shallbeupgradedto10m^3 through partial demolition and RCC extension. Internal epoxy coating and access laddershall be provided.

PolyelectrolyteDosingSystem

Parameter	Unit	Value
Sludgetobedewatered	kg/d	280
DesignPEdosage(max)	kg/tonDS	2.00
Polyelectrolyterequired	kg/d	0.56
PEsolutionstrength	%	0.1
PEsolutionvolumeperday	m^3	0.56
Dosingpumpcapacityprovided	LPH	30
Dosingpumps(W+S)	Nos	1+ 1

3.9 *TertiaryFiltration—PSFandACF*

Parameter	Unit	PSF	ACF
Numberofworking filters	No	1	1
Design flow	m^3/d	1000	1000
Operating hours	Hr	22	22

Parameter	Unit	PSF	ACF
Inletflowper filter	m^3/hr	45.5	45.5
Filtrationrate	$m^3/m^2/hr$	12	12
Area required	m^2	3.8	3.8
Diameteradopted	Mm	2200	2200
HeightofShell(HOS)	Mm	2000	2000
Backwashvelocity	$m^3/m^2/hr$	18	—
Backwashtime	Min	15	—

Backwashpumpcapacityprovided:90m^3/hrat30mhead.ThispumpalsoservesUFpre-filter backwash duty.

3.10 *Ultrafiltration(UF)System*

UFFeedTank

Parameter	Unit	Value
Numberof units	No	1
Design flow	m^3/hr	42(average)
HRTataverage flow	min	25
Volumerequired	m^3	18
Tankadopted—newconstruction(3×2×3)	m^3	18

A new RCC Filter Feed Tank of dimensions 3.0 × 2.0 × 3.0 m (18 m^3) shall be constructed adjacent to the Plant Room. Internal food-grade epoxy lining (walls + floor = 36 m^2) shall be provided. Sump pocket and level instrumentation provided for pump suction control.

UFModule Sizing

Parameter	Unit	Value	Remarks
Flowtobetreated	m^3/d	1000	
Backwashflow(5%)	m^3/d	50	UFbackwash only
TotalflowthroughUF	m^3/d	1050	
Hoursofoperation	Hr	22	
Flowperhour	m^3/hr	47.7	
Design flux	LMH	45	PVDFhollow-fibre,OEM-validated
Membraneareарequired	m^2	1,060	
Surfaceareapermodule	m^2	90	PVDFUFmodule,OEMspec
Modulesrequired (calc.)	Nos	11.8	
Modulesprovided	Nos	10	PerBOQ(Annexure-1,Item8.1);pro-rata flux 53 LMH — within 30–55 LMH operating envelope

Parameter	Unit	Value	Remarks
Area provided	m^2	900	

4. CIVIL AND STRUCTURAL REHABILITATION PLAN

The civil and structural works for the Bhattrahalli STP augmentation comprise retention of the existing civil infrastructure through internal rehabilitation, structural extension of the existing SBR basin, construction of new RCC Filter Feed Tank and Plant Room, and ancillary site works. The design complies with BWSSB norms, CPHEEO guidelines, and IS codes for water-retaining structures (IS 3370), while maximizing the reuse of the available reinforced concrete (RCC) tanks.

4.1 *Existing Civil Assessment*

The existing sewage treatment facility is located within a confined municipal plot having RCC tanks and peripheral paved areas. The treatment system presently operates as a Sequencing Batch Reactor (SBR) type installation with working capacity of 300 KLD. The civil structures — including the inlet chamber, equalization tank, SBR tank, chlorine contact tank, and sludge handling sump — are of reinforced concrete construction with adequate structural stability but limited hydraulic capacity for the proposed 1000 KLD augmentation. The following structures have been checked during the site visit:

- Inlet / Screen Chamber: RCC chamber of 1.5× 1.5 × 0.75 m, currently with manual mesh screen.
- Grit Chamber: RCC chamber of 2.0×2.0 ×1.7m.
- Equalization Tank: RCC tank of 7.0 × 4.6× 4.5m (145m^3), externally plastered and painted.
- SBR Existing Basin: RCC tank of 7.0× 5.0× 4.0m (140m^3), with decanter, aeration grid, 0.4 m freeboard.
- Chlorine Contact Tank: RCC tank of 7.0× 3.0 ×3.5m (73.5m^3).
- Sludge Sump: RCC tank of 2.0 ×1.5×3.5m (7.9 m^3).
- Peripheral area: Concrete paved platform with drainage openings, mild steel ladders for access, and existing process piping.

The structures appear in sound physical condition with minor surface deterioration, requiring waterproofing, hydraulic modification for flow redistribution, and — for the SBR basin — structural extension to deliver the required 1000 KLD reactor volume.

4.2 *Structural Assessment*

- Concrete condition: No major cracks or settlement observed; surface plaster and coating require replacement (~10% of internal wall area shows honeycomb / localized spalling).
- Ladders and railings: Existing mild steel ladders partially corroded; paint coating deteriorated; require HDG / FRP replacement.
- Drainage and access: Peripheral surface lacks proper slope; requires re-grading to channel surface runoff to drain.
- Pipeline supports: Existing GI and PVC pipelines fixed externally; need replacement with HDPE / DI-class piping during upgradation.

- SBRbasin: Existing7×5×4mbasinstructurally sound buthydraulicallyinsufficientfor 1000 KLD; requires RCC extension on three sides with waterstop at constructionjoint.

4.3 ProposedCivilRehabilitation,Modification&NewWorks

Component	ExistingStatus	ProposedCivilWork
Inlet/Screening Chamber	1.5×1.5×0.75mRCC, manualmesh	Retain; internal chipping + plaster + epoxy; replace screenassemblywithSS304mechanicalfine screen (6 mm); new handrails.
GritChamber	2.0×2.0 ×1.7mRCC	Retain;internalrehabilitation;restoregritcollection arrangement; access improvements.
Equalization/ WetWell	7.0×4.6×4.5mRCC (145 m^3)	Retain;internalplasterrepair,food-gradeepoxy coating,PUwaterproofingonexternalto pedge; upgraded aeration grid.
SBRExistingBasin	7.0×5.0×4.0mRCC (140 m^3)	Retain and extend: partial RCC demolition (~5 m^3); new extension to 9.0 × 6.5 × 6.5 m with M25 RCC walls (200 mm, ~28.6 m^3), floor slab (150 mm, ~8.78 m^3),TMTrebar(~4,767kg),PVCwaterstop(15.5m).
ChlorineContactTank	7.0×3.0 ×3.5mRCC (73.5m^3)	Retain;internalchipping+20mmwaterproof plaster +food-gradeepoxy coating.
SludgeSump	2.0×1.5×3.5mRCC (7.9 m^3)	Upgradeto10m^3viapartialdemolition(~1.2m^3)and RCC extension (~2.35 m^3); internal epoxy; access ladder.
FilterFeed Tank	Notavailable	New RCC M25 tank 3.0 × 2.0 × 3.0 m (18 m^3); raft 250mm,walls200mm,topslab150mm,TMTrebar 1,008 kg; internal food-grade epoxy 36 m^2.
PlantRoom(UF+ Panels)	Notavailable	New structure 6.0 × 4.0 × 3.5 m; RCC raft (6.0 m^3), 230mmbrickmasonrywalls(16.1m^3),RCCroofslab 150 mm (3.6 m^3), rebar (960 kg); plaster both sides, tile flooring, MS door, aluminium ventilators.
Equipment Foundations	Notavailable	RCC pedestals: PSF/ACF pads (2 Nos, 0.9 m^3), UF Skidpad(1.8m^3),Chemicaldosingpads(2Nos, 0.675 m^3), MCC +PLCpanelplinths(0.54 m^3),pipe support pedestals (20 Nos, 1.08 m^3); PCC sub-base beneath all (1.125 m^3).
CableTrench(RCC)	Notavailable	30mrun×0.6×0.6m;RCCwalls(100mm) +base (100 mm); GI grating covers (18 m^2).
Walkways,Access& Drainage	Limitedpaver+ladder	60mmpaverblockwalkway(56.6m^2);FRPhandrail (47.2 Rmt); MS access ladder with safety cage (12 Rmt); RCC peripheral surfacedrain (60 Rmt); SFRC manhole covers (6 Nos).
DG Shed	Notavailable	NewDGshedfor63kVAsetperBWSSB/ electrical safety standards. Lump sum allocation as per BOQ.

SecurityRoomwith Toilet	Notavailable	New single-room security post with attached toilet (~10m²built-up).LumpsumallocationasperBOQ.
InternalRoads	Unpaved	Bituminous / CC pavement for internal plant circulation(~200m²).Lumpsumallocationa sper BOQ.
Landscapin g&Gardenin g	Nil	Peripherallandscapingforaestheticsanddustc ontrol. Lump sum allocation as per BOQ.

- ## *Structural&FinishingWorks*
- ***Concrete: RCC with integral waterproofing compound for all new and modified structures(Fe-500Drebar at120kg/m³forwater-retaining structures,100kg/m³for Plant Room).***
- Plaster:20mmcementplaster CM 1:3withwaterproofingadditiveoninternalliquid-retaining faces; 12 mm CM 1:4 on Plant Room internal and external.
- Waterproofing: Food-grade epoxy coating (2 coats) on all liquid-retaining internal surfaces(410m² of reused tanks +36m² of FFT); PU waterproofing on externaltop edge of EQ + SBR (47.2 m²).
- Safety& Access:HDG/FRPhandrails, access ladderswithsafetycage,and maintenance walkways around SBR, FFT, and Plant Room.
- Drainage: RCC surfacedrains (1 m ×1m section, 60m run) for washwater, UF backwash, and stormwater collection; precast RCC perforated drain covers.
- Demolition&Disposal: ControlledRCCbreakingforSBRandsludge sump extensions (~6.2 m³); debris disposal within 10 km (~92.5 m³ bulked).
- Anti-termite:Pre-constructionchemicalemulsioninjectionunderallnewfoundation footprints (46.5 m²).

5. ELECTRICAL AND INSTRUMENTATION PLAN

The Electrical and Instrumentation (E&I) system for the proposed 1000 KLD SBR + UF-based STP is designed to ensure reliable, safe, and energy-efficient operation of all pumps, blowers, and treatment units. The system shall comply with relevant Indian Standards, National Electrical Code (NEC) 2023, CPHEEO guidelines, and BWSSB specifications.

5.1 *Design Basis*

- Power Supply: 415 V, 3-phase, 50 Hz AC
- Connected Load: ~101.3 kW
- Maximum Working Load: ~56.5 kW
- Estimated Energy Use: ~1,350 kWh/day
- Design Life: Minimum 15 years

5.2 *Power Supply & Distribution*

- Incoming power sourced from BESCOM 11 kV/ 0.415 kV distribution network via a dedicated transformer yard (within plant premises).
- Standby Power: 63 kVA Diesel Generator Set in dedicated DG shed, automatic changeover on mains failure.
- Power distribution through MCC with MCCBs, contactors, and overload relays.
- Separate earthing for equipment, neutral, and lightning protection.

5.3 *Motor Control Centres & Panels*

- Floor-mounted, dust- and vermin-proof IP-54 MCC panels, fabricated from 2 mm CRCA steel with powder-coated finish.
- Incomer MCCB with ammeter, voltmeter, and indication lamps.
- DOL/ Star-Delta starters based on motor rating; VFD for raw sewage and filter feed pumps.
- Interlocks, emergency stop, space heaters, internal illumination.
- Separate Lighting and Power Distribution Boards with MCB protection.

5.4 *Cables, Earthing & Lighting*

- Power Cables: XLPE insulated, armoured, as per IS 7098.
- Control Cables: Shielded copper, 1.1 kV grade.
- Cables routed on GI trays/ underground RCC cable trench with proper tagging.
- Earthing: Two independent earth pits per major equipment and panel; earth resistance ≤ 1 Ω per IS 3043.
- Plant illumination: LED luminaires with exhaust fans and ventilation in Plant Room and chemical storage areas.
-

5.5 *Instrumentation & Control*

A PLC-based automation system shall be provided for monitoring and control of the SBR and UF processes, with HMI and SCADA integration for operator control and regulatory reporting.

Parameter	Instrument	Location/Service
Flow	Ultrasonic/magneticflow meter	Inlet&treatedwaterline
Level	Ultrasonic/pressuretransmitter	EQtank,SBR,FilterFeedTank,UFfeed
pH	Onlineanalyser	Post-SBR/pre-UF
DissolvedOxygen	OnlineDOprobe	SBRbasin(2Nos)
Turbidity	Onlineturbiditymeter	Post-UFpermeate
Pressure	Pressuregauges&transmitters	Pumpdischarge,UFfeed, PSF/ACF
OnlineWQMonitor	Real-timeonlinewater-qualityanalyser	Treatedwateroutlet(KSPCBcompliance)

Signals interfaced to PLC via 4–20 mA / digital outputs.

5.6 *ControlSystemArchitecture*

- PLCPanel:Siemens/ Allen-Bradley/ABBorequivalent.
- Handlesequipmentsequencing(SBRfill-react-settle-decant-idle),interlocks,alarms, and safety shutdowns.
- ControlroomhousedinthePlantRoomwithoperatorworkstation,HMI,and SCADA.

5.7 *Safety&Protection*

- ELCBs, surgeprotectiondevicesatallpanels.
- Emergencystopswitchesnearpumps and blowers.
- CO_2 fire extinguishers near MCC panels; appropriate Class-Bextinguishers near DG set.
- Earthingmatsandinsulatedflooringin panel areas.
- CompliancewithCEASafetyRegulations2010.

5.8 *Operation,Maintenance&Calibration*

- Preventivemaintenanceof MCCsandpanels every6 months.
- Instrumentcalibrationevery3monthsorasperOEM.
- DGsettrialrunweekly;fueltop-upandfilterserviceas perOEMschedule.
- Transformerannualoiltestingandrelay coordination.
- Essentialsparestobemaintained on-site.

6. OPERATIONANDMAINTENANCESTRATEGY

A comprehensive Operation and Maintenance (O&M) strategy is essential to ensure reliable, continuous, and regulatory-compliant performance of the augmented 1000 KLD SBR + UF-basedSTP.Theupgradedtreatmentsystem—comprisingequalization,SBRbasin(existing+ extension), filter feed tank, tertiary filtration through PSF and ACF, UF system, disinfection, and mechanical sludge handling — has been designed for automated operation, process stability,reducedmanualintervention,andeaseofmaintenance,inaccordancewithCPHEEO and BWSSB guidelines.

6.1 *StaffingStructure*

Theplantshallbeoperatedwiththree-shiftoperation,eachwithonetrainedoperator,supported byonereliever.ManpowerdeploymentisconsistentwithCPHEEOnormsfora1.0MLDSTP.

Role	Nos.	Deployment
STPOperator	3	Onepershift(round-the-clockoperation)
Reliever	1	Weekly-offandleavereplacement
PlantSupervisor	1	Dayshift—responsibleforplantperformance
TotalManpower	5	

6.2 *DailyOperationStrategy*

6.2.1 Morning Shift

- Checkinletpumpingstation,equalizationtanklevels,barscreencondition,andp ump suction status.
- MonitorSBRbasin operation; verifycyclesequence(Fill,React,Settle, Decant,Idle) on PLC/HMI.
- Observeaerationperformance,bloweroperation,anddissolvedoxygentrends.
- Inspectdecanteroperationanddecantedwater quality.
- Recordflow,powerconsumption,pressure,andkeyprocess parameters.
- Reviewalarms,interlocks,andsystemstatusonPLC/HMI.

6.2.2 Evening Shift

- Inspectfilterfeedtanklevelsandtertiaryfeed pumps.
- MonitorPSFandACFpressure drops; initiatebackwash whererequired.
- Operatesludge-wastingandsludge-transferpumpspersludge-agecontrol.
- Prepareandreplenishchemicalsfordisinfection,polymerdosing,andUF cleaning.

6.2.3 Night Shift

- MonitorUFfeedpumps,trans-membranepressure(TMP),permeateflow,and quality.
- EnsureautomaticUFbackwash andintegritychecksareexecuted.
- Inspectequipmentforabnormalnoise, vibration,oroverheating.
- Maintainminimumnight-timehydraulicloadingasperdesignoperatingphilosophy.

6.3 *PreventiveMaintenanceSchedule*

6.3.1 SBR System

Activity	Frequency	Remarks
Visualinspectionofbasinandstructures	Daily	Cracks,leakages
Aerationsysteminspection	Daily	Diffuserperformance
Blowerinspection	Daily	Noise,vibration
DOprobe calibration	Monthly	Processcontrol
Decanterinspection	Weekly	Smoothoperation
Structural/waterproofingcheck	Quarterly	Civilintegrity

6.3.2 TertiaryFiltration(PSF&ACF)

Activity	Frequency
Backwashing	Daily/ΔP>0.8 kg/cm²
Underdrainandnozzle inspection	Monthly
Mediatop-up	Half-yearly
Mediareplacement	Every18–24 months

6.3.3 Ultrafiltration(UF)System

Activity	Frequency	Remarks
Permeatebackwash	Every20–30min	Automatic
CEB(NaOCl/acid)	Daily	OEM-validatedchemicals
FullCIP(alkaline+acid)	MonthlyorTMP>1bar	TMPcontrol
Membraneintegritytest	Monthly	PDT/bubbletest
Membranereplacement	Every3–5years	Sitewaterqualitydependent

6.3.4 SludgeHandling

- Operate sludgepumps daily.
- Centrifuge/screw-pressoperationper sludge load.
- Cleanpressandpolymerlinesdaily.
- Maintainsludge dryingbeds(ifany)weekly.

6.4 *Electrical,Instrumentation&AutomationMaintenance*

6.4.1 ElectricalSystem

- Panelcleaning &tightening→Monthly.
- Cableinsulation/meggertesting→Half-yearly.
- Earthingresistancecheck→Half-yearly.
- DGsettrialrun →Weekly;oil/filterserviceperOEM schedule.
- Transformerannualmaintenanceincludingoiltesting.

6.4.2 Sensors&Online Instrumentation

Instrument	Frequency
Leveltransmitter check	Monthly
Flowmeter verification	Monthly
Turbiditysensors	Monthly
OnlinepH/DOanalysercalibration	Monthly
OnlineWQanalyser(KSPCB)	Aspermanufacturer/regulatory

6.4.3 PLC

- Backupof PLC logic→Monthly.
- IOtesting andalarmcheck→Quarterly.
- Recordofinterlocks,shutdowns,andevents→Daily.

6.5 *ChemicalHandlingandStorage*

- Storechemicalsinventilatedchemicalroom.
- MaintainMSDS (MaterialSafetyDataSheets)foreachchemical.
- EnsurePPE:gloves,goggles,apron,mask.
- Providespillcontainmenttraysundertanks.
- Polymersolutionpreparedaspermanufacturerguidance;hypochlorited osed continuously per flow; acid/alkali dosed per CEB/CIP schedule.

6.6 *Reporting,Documentation&Compliance*

6.6.1 Daily Records

- Flowreadings(inlet/outlet).
- Power consumption.
- pH,turbidity,pressure,TMP.
- Sludgequantitypumped.
- Chemicalusage.

6.6.2 WeeklyRecords

- Sludgedewateringlog.
- Filterbackwashlog.
- Maintenanceperformed.

6.6.3 Monthly Reports

- Laboratoryanalysis(KSPCBnorms).
- Preventivemaintenancechecklist.
- Summaryof chemical&energyconsumption.

7. EXECUTIONSTRATEGY

The augmentation of the existing 300 KLD STP to 1000 KLD SBR + UF-based STP at Bhattrahalli Lake shall be executed through a structured, phased, and time-bound implementationmethodology.Thestrategyensuresminimaldisruptiontoexistingoperations, maximumreuseofexistinginfrastructure,safetycompliance,andtimelycommissioningwithin a 5–6 month end-to-end window.

7.1 *ProjectImplementationApproach*

Theprojectshall beexecutedthrough thefollowingsequential stages.

Stage1—Pre-ConstructionActivities(0–30 Days)

- Detailed Site Verification & Joint Measurement ——verify all existing structures (EQ tank,SBRtank,sludgetank, piping);preparejointmeasurementreportwithBWSSB officials.
- Finalization of Good-for-Construction (GFC) Drawings — detailed process, hydraulic, civil, electrical, and I&C drawings; approval from BWSSB technical committee.
- Work Permit & Mobilization — contractor mobilizes labour, machinery, shuttering, fabrication shop, safety systems; temporary plant bypass arrangements for SBR extension works.
- Procurement Planning — long-lead items (UF skid with 10 modules, raw-sewage pumps,MCCpanel,PSF/ACFvessels);approvalofmakesandQAplans.

7.2 *Stage2—CivilRehabilitation&StructuralWorks(Month1–3)*

A. Pre-Execution&Tank Cleaning

- Tankdewatering ofall 6reusedtanks (~377m³).
- Removaloffloatingdebris,scum,andsettledsolids (~75 m³).
- Confinedspacesafetyarrangementsduringcleaning.

B. Equalization Tank

- Internalchippingofunsoundconcrete(walls +floor).
- 20mmplasterCM1:3withwaterproofingadditive.
- Food-gradeepoxycoating(2coats)oninternal faces.
- PUwaterproofingonexternaltopedge strip.
- Upgradedaerationgrid andinletbaffle.

C. SBRExtension(CriticalPath Item)

- Controlled RCCbreakingofexistingSBRwallforextension cut-in(~5m³).
- CorecuttinginexistingRCCfornewpipingpenetrations (~20 Nos).
- NewRCCM25 extensionwalls200mmthick(~28.6m³) onthree sides.
- NewRCC M25floor slab150mm thick(~8.78m³).
- TMT Fe-500Dreinforcement @120kg/m³(~4,767kgtotal).
- PVCwaterstopatconstructionjointwithexistingwall(15.5 m).
- Internalchipping, 20mmwaterproofplaster,food-gradeepoxy coating.

D. Filter Feed Tank (New Construction)

- Earth excavation ~24 m³; anti-termite treatment.
- PCC M15 levelling course; RCC M25 raft (250 mm), walls (200 mm), top slab (150 mm).
- TMT rebar 1,008 kg; internal food-grade epoxy lining.

E. Plant Room (New Construction)

- RCC raft 6.0 m³; 230 mm brick masonry walls 16.1 m³; RCC roof slab 3.6 m³; rebar 960 kg.
- Plaster both sides; anti-skid ceramic tile flooring; MS door and aluminium ventilators.

F. Sludge Sump Upgrade

- Partial demolition and RCC extension to upgrade 7.9 → 10 m³.
- Internal epoxy coating, access ladder.

G. Equipment Foundations & Cable Trench

- RCC pedestals for PSF/ACF pads, UF skid, chemical dosing pads, panel plinths, pipe supports.
- Cable trench 30 m with RCC walls + base and GI grating covers.

H. Ancillary Civil Works

- Paver block walkway (56.6 m²); FRP handrails (47.2 Rmt); MS ladders with safety cages (12 Rmt).
- RCC peripheral surface drain (60 Rmt) with SFRC manhole covers.
- DG shed; Security room with toilet; internal roads; landscaping.

7.3 *Stage 3 — Electromechanical Supply & Installation (Month 2–4)*

A. Pumps & Piping Installation

- Raw-sewage pumps (2 × 90 m³/hr), filter-feed pumps, sludge pumps, UF feed pumps.
- SS/ HDPE process piping as per layout; NRVs, butterfly valves, motorized actuators.
- Yard piping including DIK 9 piping (100 mm and 150 mm dia).

B. Secondary & Tertiary Treatment Units

- SBR package: 2 twin-lobe blowers (600 Nm³/hr), 66 disc-type diffusers, fixed decanter, SBR piping, outlet motorised valve, PLC-based SBR automation.
- Tertiary: PSF and ACF assemblies (2.2 m dia) with media (sand, pebbles, coarse sand; carbon 3,300 kg).
- Backwash line interconnections; pressure gauges, rotameters.

C. Ultrafiltration System

- Installation of UF skid with 10 membrane modules (PVDF, 90 m² each).
- TMP monitoring, CIP tank, CEB-1/2/3 dosing system.
- Permeate and reject line connection; chlorination dosing system.

D. SludgeDewateringSystem

- Centrifugedewateringsysteminstallation.
- Polyelectrolytepreparationanddosingunitintegration.
- Sludgeconveyancelineto dewatering.

7.4 *Stage4— Electrical&InstrumentationWorks(Month3–5)*

A. ControlPanels

- InstallationofMCCpanel(PanelEnclosure+MCCBswitchgear).
- Routingofpowerand controlcablesthroughGItrays/ RCCcable trench.
- Earthinggrid installation.

B. DG Set&Transformer

- Installation andcommissioningof63kVA DGsetinDGshed.
- Transformeryardcablingandprotectioncoordination.

C. Instrumentation

- Ultrasonicflowmeters(inlet +outlet), leveltransmitters(4Nos),pHanalyser,DO probes (2 Nos), turbidity meter.
- WiringtoPLC;HMI/ SCADAintegration;KSPCBonlineWQ analyser commissioning.

D. Safety&Compliance

- ELCB/MCBprotection.
- Lightningarrestorinstallation.
- Cableterminationtesting.

7.5 *Stage5— Testing,Commissioning&Stabilization(Month 5–6)*

A. Pre-CommissioningTests

- Hydro-testing oftanksandpipelines(watertightness:SBRextension, FilterFeed Tank, rehabilitated tanks).
- Electricalpanelinsulation&continuitytests.
- Dry-runtestingofpumpsandblowers.

B. Wet Commissioning

- Fullhydraulicrunwithrawsewage.

- SBRsludgewithdrawalcyclevalidation(Fill→React→Settle→Decant→Idle).
- Mediabackwash (PSF/ ACF)and UFintegrity verification.

C. 30-DayTrialRun(DPRMandatory)

- Continuous plantoperation for30daysat1000KLDdesignflow.
- Fine-tuningofdosing,flowbalance, SBRcycletimings,and automation.
- Performancecertificationissued after compliancewith BOD< 10, COD<50, TSS< 10, pH 6.5–8.5.

ProjectTimeline

Phase	Duration	KeyActivities
Pre-Construction	2 months	Surveys,designs,GFCapproval,mobilization,long-lead procurement
CivilWorks	3 months	Tankrehabilitation,SBRextension,FilterFeedTank, Plant Room, ancillary
MechanicalInstallation	2 months	Pumps,blowers,PSF/ACF,UFskid,sludgehandling
Electrical&I&CWorks	2 months	MCC,PLC,instrumentation,DGset,transformer
Commissioning&Trial Run	2 months	Testing+30-daystatutorytrialrun
TotalDuration	11-12months	End-to-end(withparallelstreams)

Released Materials -

Old scrap material inclusive of decommissioned electro-mechanical equipment shall be dismantled and handed over to BWSSB / Engineer In-charge in full manner.

Specifications as per relevant IS Codes and

Bill of Quantities

SECTION 8:

DRAWINGS

(Annexed in Karnataka-Public Procurement Portal separately)

SECTION 9:

BILL OF QUANTITIES

(Filled vide Karnataka Public Procurement portal under financial document through work template)

Note:

(1) Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities (refer: ITB Clause 11.2 and CC Clause 37.2).

(2) Unit rates and prices shall be quoted by the Tenderer in Indian Rupees.

(3) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern [ITT Clause 24.1 (b)]

SECTION 10:

FORMAT OF BANK GUARANTEE FOR SECURITY DEPOSIT

To: _____ [name of Employer]
_____ [address of Employer]

WHEREAS _____ [name and address of Contractor] (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. _____ dated _____ to execute _____ [name of Contract and brief description of Works] (hereinafter called "the Contract");

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of Rs._____ [amount of guarantee] [63]_Rupees_____ _____[in words], and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ [amount of guarantee][64] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until 30 days from the date of expiry of the Defects Liability Period.

Signature and seal of the guarantor _____
Name of Bank _____
Address _____
Date _____

[63] An amount shall be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract.